The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE *is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders, and Postal Orders should be made payable to Benn Brothers, Ltd.*

Benn Brothers, Ltd., proprietors of THE CHEMICAL AGE, *have for some years past adopted the five-day week, and the editorial and general offices (Bouverie House, 154, Fleet Street, London, E.C.4) are closed on Saturdays.*

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Salesmanship: The Lesson of the Fair

THE PRINCE OF WALES, in emphasising the importance of good salesmanship to British industry, has thrown into relief the central purpose of the British Industries Fair. The Fair has nothing to do directly with invention or manufacture; its sole purpose is to put on view things already invented and manufactured in this country, and to promote their purchase, especially by overseas customers. The Prince has had some considerable experience of our overseas dominions and colonies, as well as of other countries, and he states what is almost a truism when he testifies that while a British community overseas may be anxious to buy British goods, it is often unable to do so because our goods are not suitable or practicable to the locality. That indicates a failure on the part of the manufacturers to study the local conditions and needs of overseas markets which, in turn, indicates an absence of imagination and the consequent incorrect assumption that what is suitable at home must be suitable everywhere else.

In the valuable economic and financial reports on British overseas and foreign markets, issued by the Department of Overseas Trade from time to time, this point is constantly being emphasised. It is clear, from the attention that the Prince's remarks have attracted, that he has touched a weak spot in our commercial organisation. His criticism, indeed, need not have been so strictly limited. He might with equal truth have said that even where we produce suitable goods they are often not purchased because the potential customer is unaware even of their existence. Not only is this so overseas, but it is true of home conditions. The public would be surprised to know how much of our own time is occupied in telling chemical inquirers where they can get the products they need. Goods are in existence; there are customers waiting for them; but neither knows of the other's existence. The faith in our omniscience as a liaison agency for the diffusion of commercial knowledge is at times quite touching. Only this week we had an inquiry from an important city in Pennsylvania respecting the address of a distinguished chemist who had recently written an article on resins. With the aid of the Paint and Varnish Research Association, we located the gentleman's address in Washington, and our esteemed correspondents, inquiring *via* THE CHEMICAL AGE in London, will learn the information they want respecting their near neighbour in the United States capital. The Prince is undoubtedly right in saying that there is a gap somewhere between the manufacturer and the customer which can only be bridged by efficient salesmanship, and the manufacturer will not get the reward of his labour until this is supplied.

We are glad that the Prince selected this subject, because more than once THE CHEMICAL AGE has pointed out the lack of any organisation for chemical salesmen in this country. In the United States there is a Salesmen's Association of the American Chemical Industry, which is a very active body, and stimulates traffic in chemicals by raising the general standard of salesmanship. Here we have organised bodies of nearly every variety of chemist and chemical engineer, all concerned in activities leading up to manufacture, but for those whose essential job it is to sell the manufactured products to the customer there is no organisation, no opportunity of comparing methods and exchanging knowledge with the idea of raising the whole level of selling efficiency. Each firm ploughs its lonely furrow, insulating itself as far as possible from all its fellows. It is a mistake, this policy of segregation. We have seen within a few years a new science of chemical engineering come into existence. The science of salesmanship equally needs organising.

The reports so far received concerning the chemical Section of the Fair are favourable. The attractively arranged stands of chemical products not only appeal to the public more than would have seemed possible a few years ago, but are bringing a steady flow of

business inquiries, with a certain proportion of orders. In publicity schemes of this kind it is always difficult to trace the actual results, but experience shows that the results invariably do arrive, though, like bread upon the waters, it may be after many days. The chemical firms have now passed this stage of commercial education, and realise that they could not afford to remain outside a national effort of this kind.

Fast Dyeing and Dyes

THOSE who induced Mr. James Morton, the founder of Sundour Fabrics and later of Scottish Dyes, Ltd., to overcome his dislike of publicity so far as to tell, as he did in his lecture at the Royal Society of Arts on Wednesday evening, the whole story of the development of fast dyeing and dyes in this country, deserve our thanks, for a story more full of realised artistic ideals, technical achievement, and human interest has rarely been made known. This week we publish that part of the story that ends with the outbreak of war in 1914. In future issues we hope to publish in full the remainder.

Mr. Morton's work falls broadly into four stages—first, the production of beautiful tapestries and other coloured fabrics from his own looms; secondly, the discovery that the colour schemes of these products were lost because of the fugitive character of the dyes used, and the resolution to find dyes that would not fade and could be commercially guaranteed; thirdly (a sufficient range of fast dyes having been secured, mainly from Germany), the study of the application of these vat dyes both to coloured fabrics and to piece goods and the entrance into the dyeing industry; lastly, and perhaps most interesting of all, the shock of finding his life-work threatened by the cutting off of dye supplies owing to the war, and his triumphant success, after exceptional difficulties, in producing the vat dyes needed for his own purposes and even surpassing the Germans in their own field. Mr. Morton's success was already known in its more general aspects. But the steps by which it was achieved, the almost endless technical difficulties and discouragements that were encountered and overcome, and the enormously important scientific and commercial results finally achieved are now made known in detail for the first time. One has a feeling that so remarkable a contribution ought to have taken some official form, such as the Messel Lecture. But it is a satisfaction to have it in any case.

Still Improving Chemical Trade

1928 will be remembered as a year of steady recovery in overseas chemical trade. 1929 has started well. The first month's figures show an improvement on the January figures of a year ago, and a very much greater improvement on the corresponding figures in 1927. Everyone will hope that this good start will be confirmed month by month; there seems no reason why it should not be if the opportunities of developing overseas trade are fully explored by chemical firms catering for the export markets and potential customers throughout the world are kept informed of what this country can supply.

The value of the chemicals, drugs, dyes and colours exported during January was £156,101 more than in January, 1928, and though the imports showed an even larger increase of £185,826, the total increase in overseas traffic in chemical products is a good sign. The most notable increases in imports are in tartaric acid (£2,669 to £19,598) sodium nitrate (£102,663 to £147,104) miscellaneous drugs, etc. (£128,539 to £265,917) and painters' miscellaneous materials (£133,836 to £185,189). On the other hand, acetic acid imports fell from £66,426 to £29,273 and coal tar product imports from £40,565 to £6,221. On the export side, the largest increase is in sulphate of ammonia, which has risen from £286,438 to £448,658. Coal tar products, however, have fallen from the high figure of £256,079 last year to £115,037, which is still nearly £12,000 in excess of the 1927 total. The drop in glycerine crude and distilled is notable; the exports which in January of 1927 stood at £74,207, and in 1928 at £60,604, are now reduced to £18,304. Potassium compounds, are little changed, but sodium compounds are £117,815 down on January of last year, and nearly £14,000 below 1927. In coal tar dyestuffs there is a marked advance from £55,761 to £98,590, and painters' colours, always a strong feature, have improved from £302,547 to £356,885.

Books Received

CHEMISTRY IN DAILY LIFE. By Dr. S. Glasstone. London: Methuen and Co., Ltd. Pp. 250. 6s.

UBBELOHDE'S HANDBUCH DER CHEMIE UND TECHNOLOGIE DER OLE UND FETTE. Edited by Dr. Hans Heller. Leipzig: S. Hirzel. Pp. 791. 75 Marks.

BRITISH CHEMICALS. OFFICIAL DIRECTORY OF THE ASSOCIATION OF BRITISH CHEMICAL MANUFACTURERS FOR 1929. London: Ernest Benn, Ltd. Pp. 300. 10s. 6d.

THE TEXTILE RECORDER YEAR BOOK FOR 1929. Manchester: John Heywood, Ltd. Pp. 996. 7s. 6d.

APPLIED CHEMISTRY. By C. Kenneth Tinkler and Helen Masters. London: Crosby, Lockwood and Son. Pp. 296. 15s.

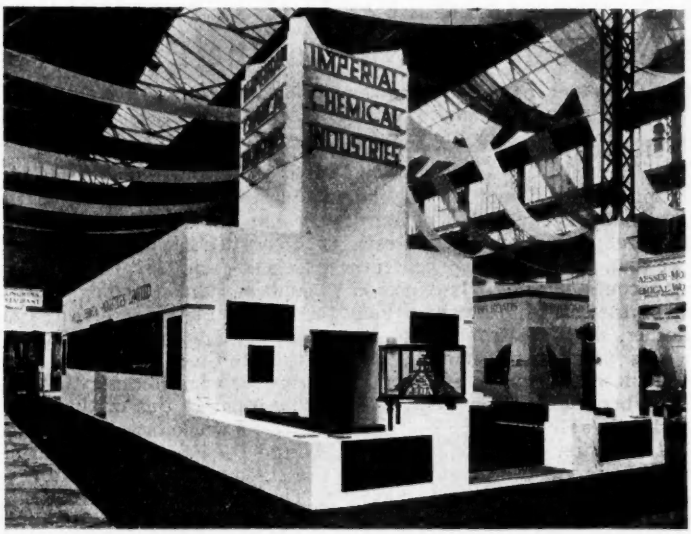
MEMORANDUM ON THE MANUFACTURE, USE AND STORAGE OF CELLULOSE SOLUTIONS. London: H.M. Stationery Office. Pp. 12. 3d.

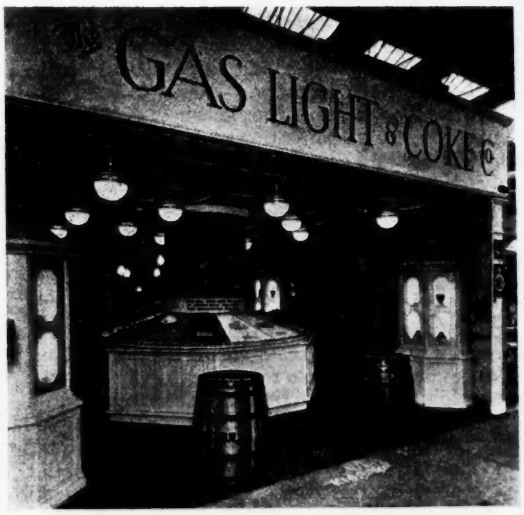
CHEMICAL DICTIONARY. German-English-French. Compiled by A. W. Mayer. Leipzig: Otto Spamer. Pp. 826. Rm. 75.

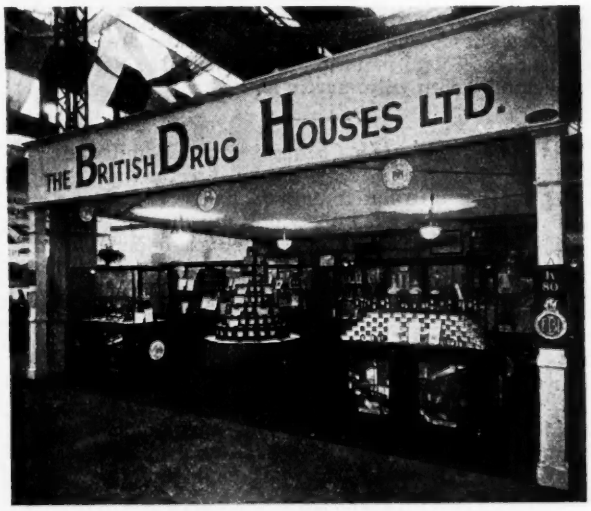
The Calendar

Feb. 25	University of Birmingham Chemical Society: "The Unsaponifiable Portion of Natural Fats." Professor I. M. Heilbron.	University, Birmingham
26	Royal Photographic Society. 7 p.m.	London.
27	Institute of Chemistry (Belfast Section): "The Botanist and the Flax Plant." G. O. Searle. 7.30 p.m.	Belfast Royal Academical Institution
27	Royal Society of Arts: "Resins." A. F. Suter. 8 p.m.	John Street, Adelphi, London
27	Society of Chemical Industry (Glasgow Section): F. S. Sinnatt on "Fuel Research."	Engineers' and Shipbuilders' Institute, Glasgow
28	Institute of Metals (Birmingham Section): "Metallurgy and the Evolution of the Balance." W. A. Benton. 7 p.m.	Engineers' Club, Waterloo Street, Birmingham
Mar 1	Finsbury Technical College Old Students' Association: Annual Dinner, 6.30 for 7 p.m.	Trocadero Restaurant London.
6	Society of Public Analysts. Annual General Meeting. 8 p.m.	Burlington House, London.
15	Oil and Colour Chemists' Association: Annual Dinner.	Connaught Rooms, London.
15	Society of Chemical Industry, Institute of Chemistry, and Newcastle Chemical Industry Club. Joint Dinner. 7.15 p.m.	Tilley's Restaurant, Blackett Street, Newcastle.
21	Chemical Society. Annual General Meeting and Anniversary Dinner.	Leeds.

Chemical Exhibits at the British Industries Fair







Chemicals at the British Industries Fair

A General Review of the Exhibits

In last week's issue of THE CHEMICAL AGE, *a preliminary account was given of the exhibits of chemical interest at the British Industries Fair, which opened at London and Birmingham on Monday, and will continue until Friday, March 1. In what follows, some impressions are given of the general aspect of the chemical section of the Fair, which is situated in the London division at the White City, Shepherd's Bush.*

CHEMICAL research and its applications do not always lend themselves to prominent public display. The outward sign and visible symbol of several years of intensive investigation is often nothing more than the unobtrusive contents of a bottle or sack. On this account, it is not to be expected that the chemical section of the British Industries Fair will, from one year to another, show great and profound alteration. The exhibits this year at the White City, London, are mainly on well-known lines; though certain trends of development tend to become more clear-cut.

One feature conspicuous by its absence is the chemical plant section (as individual exhibitors). A few of the exhibitors (as indicated below) show products belonging to the realm of chemical plant and engineering. The section as a whole is represented by the stand of the British Chemical Plant Manufacturers' Association, which adjoins that of the Association of British Chemical Manufacturers. At these two stands officers of the Associations are present to attend to general inquiries, and should be able to deal very helpfully with visitors from abroad.

This year the British Chemical Plant Manufacturers' Association has published an official directory (pp. 120), which is being distributed at the Fair. The directory opens with a list of members (comprising some forty names), giving in each instance a list of the products manufactured. This section is followed by one giving an alphabetical classified list of products and manufacturers, which covers 42 pages and is very comprehensive. The numerous advertisements which appear in the directory have been pressed into service by including references to the pages on which they occur in the list of members. The book, which is published from the offices of the Association at 166, Piccadilly, London, W.1, is handsomely produced, and is clearly destined to become a well-thumbed member of the bookshelf of every chemical works and laboratory.

In the course of a letter published in this journal recently, Mr. J. Davidson Pratt, general manager of the Association of British Chemical Manufacturers, said that "the Association, in pursuance of its constant policy of stimulating and maintaining the connection between research and industry, has invited every Professor of Chemistry at recognised Universities and Technical Colleges throughout the country, together with their assistants, research and senior students, to visit the Fair in organised parties. Through the co-operation of the Department of Overseas Trade, these parties will be taken round the chemical section in the mornings by competent guides, so that the various exhibits may be explained in detail. By this means, they will be brought into direct contact with the very latest developments in the chemical world. Not content with this, and believing that qualified teachers of chemistry in general would benefit by first-hand acquaintance with the latest triumphs of British chemical industry, the Association has also sent an invitation to all recognised teachers of chemistry in public and secondary schools throughout the country. The Fair offers perhaps the finest opportunity of seeing the latest developments in chemical industry, and it is hoped to make this educational aspect a permanent feature of future Fairs."

It is of some interest, in this connection, that in an account published in this journal last year of the Fair of 1928 our technical correspondent wrote: "It would be an excellent thing if chemical societies encouraged their members, and teaching institutions their students, to attend the British Industries Fair each year, in order to see what is going on in the British chemical industry. This is the one time in each year when an opportunity arises of seeing the whole industry in perspective. At other times—in meetings in this or that town, in visits to this or that works—a single facet engages the attention of the chemist. At the B.I.F. all the industrial results of his science are presented to him collectively."

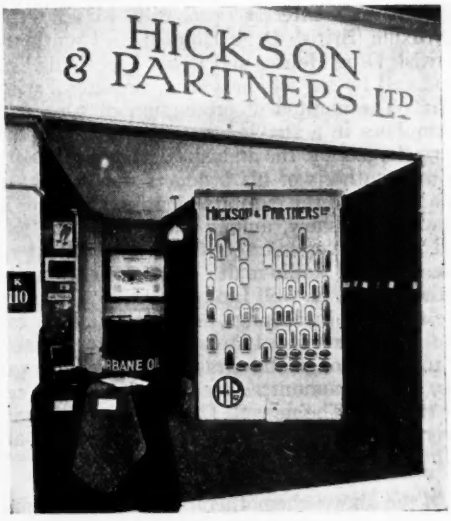
The invitation of the A.B.C.M. seems to have been cordially received, for parties of students were already being conducted round the Fair early in the week. Groups of embryo Armstrongs, Carrs, Morgans, and Pollitts (and possibly also Monds and McGowans) passed from stall to stall, to be heartily welcomed and initiated into the mysteries of industrial chemistry. It was difficult to decide which was the greater—the keenness with which the students absorbed information or the obvious gusto with which the presiding genius of each stall imparted it. It is already clear that this is destined to become one of the most popular, as well as one of the most important, of the aspects of the chemical section of the B.I.F.

On Tuesday, the chemical section was among those honoured by a visit from the Prince of Wales. This visit followed on the dinner held in connection with the Fair on the previous evening, at the Mansion House, London, when the Prince made a notable reference to the importance of salesmanship. In reply to the Prince's speech, Mr. W. J. U. Woolcock, who for many years was associated with the Fair as the organiser of the Chemical Section during his general managership of the Association of British Chemical Manufacturers, expressed on behalf of the London exhibitors their thanks to the Prince, remarking that among the contributions of his Royal Highness none had been more helpful and encouraging than the speech they had listened to that evening.

The largest single exhibit is that of Imperial Chemical Industries, which, as compared with last year, shows considerable expansion. The central point of the exhibit is, as before, the cinema hall in which are shown films illustrating various aspects of the firms' exhibits, i.e., "The Manufacture of Heavy Chemicals," "The Manufacture of Dyestuffs," "A Quarry Blast," and "The Use of Fertilisers." Around this hall are many of the manufactures of I.C.I., a further range of which appears on additional stands.

A new feature is the display of various grades of Portland cement manufactured by Casebourne and Co. (1926), Ltd. This company was absorbed by I.C.I. after the first formation of the combine, one of the objects of the absorption being the disposal of the vast quantities of calcium carbonate which are the by-product of the manufacture of synthetic ammonium sulphate at Billingham-on-Tees. This problem is now solved by the conversion of the calcium carbonate to cement in the works of Casebourne

Chemical Exhibits at the British Industries Fair



and Co., which adjoin the synthetic ammonia works. Two brands of cement are exhibited, the Pioneer brand and the Steelcrete (or rapid-hardening) brand. This exhibit exemplifies, in a most striking way, two very important points which arise in many cases of large-scale chemical manufacture: that is, the problem of the disposal of by-products and the manner in which the problem is solved.

On the chemotherapeutic side, the present position is a very interesting one. In the last few years, a great deal of work has been done on the preparation of various natural and synthetic products, both by industrial firms and by various other bodies. The necessity for the better treatment of several widespread and dangerous diseases, however, brooks no delay, and on this account a committee has been set up by the Department of Scientific and Industrial Research and the Medical Research Council which will attempt to co-ordinate all research now in progress, while at the same time proceeding with a programme of research of its own. Some of the work on the chemical side will be done at Teddington. Chemotherapy is one of the aspects of science about which very little is known, and it is therefore a matter for congratulation that it is at last to be the subject of systematic investigation.

As far as actual exhibits at the Fair are concerned, the greatest interest probably attaches to synthetic thyroxine (British Drug Houses), and synthetic vitamin-D (British Drug Houses and Boots Pure Drug Co.), the latter produced by the irradiation of ergosterol with ultraviolet light. The method of production of synthetic vitamin-D exemplifies in a striking way the new weapons which are being forged by the industrial chemist, who now applies to the synthesis of his products not only heat, but light. In addition to the exhibits mentioned above, British Drug Houses also show, among their numerous fine chemicals and drugs, liver extract (for the treatment of pernicious anæmia), and Radio-malt. Special mention must be made of the "B. D. H. Golf Links Outfit." The growth of grass, like that of other things, depends to a large extent on the acidity of the soil. Lately, great interest has been taken in the question of the grass on golf-course greens, and a very strong committee has been appointed to investigate the matter. The new B. D. H. outfit makes it possible to determine the acidity of a soil with great ease, and the outfit will probably be in very great demand.

To the above chemotherapeutic products may be added the products shown at the stand of the Mond Staffordshire Refining Co., which is among this year's new exhibits. The company is showing its extensively and attractively advertised Monsol antiseptic products in various forms—liquid, ointment, throat pastilles, internal capsules, anti-bite sticks, and dental cream. All these products contain the peculiarly effective Monsol oils, which, in addition to their high germicidal power, have the properties of being non-caustic and extraordinarily penetrative. The attention of buyers was being particularly directed to Monsol Medicated Dental Cream, the latest addition to the Monsol group. This product, in addition to containing a concentrated form of the Monsol antiseptic, which has been proved to possess unprecedented powers for destroying the bacteria which cause dental decay, is compounded entirely of ingredients known to possess particular qualities for arresting dental decay and protecting the delicate enamel of the teeth. It is described as pleasant to use and as leaving a refreshing taste in the mouth.

Howards and Sons also show numerous therapeutic products, including quinine salts and their derivatives. As the result of negotiations with the Department of Customs and Excise, the company is also able to supply pure anæsthetic ether made from duty-free pure rectified spirit (and therefore free from impurities) at the same price as that formerly charged for ether made from ordinary industrial methylated spirit.

There are two exhibits of chemical engineering interest. The first is at the I.C.I. stand, a subsidiary company showing plant and apparatus for electric welding. Butt, spot, etc., electrical welding plant is shown by the Premier Electric Welding Co., for the welding of wrought iron, mild steel, brass, copper, etc., as well as electrodes for the purpose. It is necessary to have different classes of electrodes in order to ensure the best results in the very numerous applications of electric arc welding. The Premier company has from time to time added to its types of electrodes, and now markets an electrode to suit every special purpose in the welding of iron and steel, etc.

The other chemical engineering exhibit is that of Dexine, Ltd., rubber and ebonite product manufacturers. The products shown are mainly of Dexonite, a super-ebonite. It is used as a lining for acid vats, storage tanks, saturators, filters, etc.; for acid pipes, stop-cocks and valves, guage fittings and numerous accessories; as a covering for agitators, rollers, etc. Numerous products of this kind are shown.

An interesting and instructive case of the effect of the onset of synthetic products deserves notice. The Graesser-Monsanto Chemical Works, Ltd., produce an excellent grade of vanillin from clove oil, which latter is a product of cloves grown in Zanzibar. It was recently reported in these columns that the clove growers of Zanzibar were beginning to feel somewhat disturbed because of the production of vanillin from other (synthetic) sources, since they suspect that the competition of the latter may lead to a lower demand for their produce, with consequent unhappy effects for Zanzibar. Fortunately, they seem to have taken the matter seriously to heart, and schemes for the rationalisation of the Zanzibar clove industry are being mooted. Such rationalisation, if effected, may lead to greater efficiency, in which case (not for the first time) the competition of a synthetic substance will lead to increased vigour on the part of industries assisting in the production of the natural one.

The dyestuffs industry is represented by Brotherton and Co., Hickson and Partners, L. B. Holliday and Co., I.C.I., and Williams (Hounslow), while intermediates are shown by a number of others. It is hardly necessary to state that these manufacturers cover a very wide range. Among novelties, some of the products of L. B. Holliday and Co. may be mentioned. Among the brilliant acid dyes shown by this firm is Acid Violet 6 B oo, made for the first time in Great Britain. There is also a new, very fast acetate silk dye—Solvacyl Yellow. The latter is to be the first of a series.

Among solvents, some interesting new products are forthcoming. Howards and Sons are now producing ethyl lactate, a substance of great importance in this field. Other products include the plasticiser Barkite (methylcyclohexanyl oxalate); methylcyclohexanone (Sextone "B"); cyclohexanol; cyclohenanyl oxalate (a plasticiser); and cyclohexanyl acetate. Solvents are, of course, attracting a great deal of attention, in view of the immense growth of the lacquer industry. A number of manufacturers are known to be interested, prominent among whom is the Distillers' Co. The latter is known to have some very big developments in hand, and the Fairs of the next few years may be expected to be especially interesting from this point of view.

Synthetic resins and products therefrom are represented by two firms. In the first place, moulding powders from thiourea resins are shown by the British Cyanides Co.

The use of these products is illustrated by a machine producing mouldings, while an associated company, the Beetle Products Co., shows, at an adjoining stand, some of the beautiful ware produced by this means.

Another aspect of synthetic resins is provided by the firm of Birkbys, Ltd., which produces resins of the phenol-formaldehyde type. At this stand are shown moulding powders, mouldings, and various completed articles in this type of resin, all the processes, from the production of the synthetic resin to the manufacture of the finished article, being carried out at the firm's factory at Liversedge.

Numerous derivatives of coal tar products, among other things, are shown by the Graesser-Monsanto Chemical Works, including pure phenol, pure cresols, and cresylic acid, as well as certain products derived from these, such as salicylic acid, ortho cresotinic acid, chlor phenols, etc. Of special interest are acetyl salicylic acid and saccharin.

By-products from the manufacture of coal gas are shown by the Gas Light and Coke Co., including naphthalene, salicylic acid, prussian blues, and so forth.

Fine and research chemicals appear in great abundance at the stands of Boots Pure Drug Co., British Drug Houses, the General Chemical and Pharmaceutical Co., and Thomas Tyrer and Co. In addition to its "Judex" analytical reagents, the General Chemical and Pharmaceutical Co. also shows chemicals for electroplating and process engraving, as well as accumulator acid. Thomas Tyrer and Co. show the "Sterling" brand of reagent chemicals, as well as paint driers, cadmium sulphide, and bismuth compounds. In view of the immense development in recent years of catalytic processes of various kinds, in which nickel plays such an important part, considerable interest attaches to Tyrer's display of nickel formate for use in the production of metallic nickel as a hydrogenation catalyst and for similar purposes.

An interesting development in which the firm of Thorium, Ltd., are concerned is the production of a helium from monazite sand. The work on the subject is actually being done by Dr. G. T. Morgan and his staff at the Chemical Research Laboratory, Teddington, the sand being supplied by Thorium, Ltd. Apart from this, the company has now developed its processes to the point where it produces 6-7 mg. of mesothorium bromide per ton of monazite residues. Hopkin and Williams (Travancore), Ltd. include among their activities the production of titanium paint.

Inorganic acids of various strengths and degrees of purity are shown by Spencer, Chapman and Messel, a special attraction being a beautiful display of sulphur trioxide crystals.

That most vital product, filter paper, is exhibited by T. B. Ford, Ltd. The exhibit includes filter paper in the form of sheets and circles of various sizes and colours. Filter pulp with and without asbestos is shown. The company provides four papers of low ash weight for analytical, qualitative, quantitative, and pharmaceutical purposes. In addition, the well-known Ford blottings are on view.

Mention may be made here of the exhibit of Johnson, Matthey and Co., which is not in the chemical section, but which includes platinum, silver, and gold in their various forms, such as sheet, wire, tube, gauze and compounds of the metals. Especially interesting is a silver condensing coil, as supplied to the chemical industry, 53 inches in height and 18 inches in diameter. Electrodes of various metals are also on view.

Another exhibit of chemical interest is that of William A. Webb and Co., which consists of chemical and other balances, and is shown in the scientific instruments section.

The display of perfumes, essences, essential oils and other products is, as usual, a strong feature, the exhibits including those of W. J. Bush and Co., A. Boake Roberts and Co., and the British Aromatic Chemical Works. Albright and Wilson show, among other things, silicon ester for stone preservation and restoration and silicon ester paint. The British Road Tar Association's stand illustrates the uses of British tar for roads.

Barytes in various forms is shown by Barium Consolidated, Ltd. This company, which is engaged in working deposits of barytes which occur in the Irish Free State, will be producing at the rate of 20,000 tons of material per annum by the end of 1929, and two-and-a-half times this quantity at the end of the next year. The increasing demand for barytes and kindred products is shown, for example, by the great increase in the manufacture of lithopone in the last few years.

Chemical Exhibits at Birmingham

At the Birmingham section of the British Industries Fair, which is being held at Castle Bromwich concurrently with the London section, there are many exhibits of interest to the chemist and chemical engineer. Chemical works equipment is a strong feature; varnishes, enamels, paints, preservatives are well represented; and oils, lubricants and greases command attention. Attention may be drawn to exhibits of plant in non-corrodible metals and alloys.

The British Road Tar Association demonstrate the importance of obtaining a non-skidding road surface by employing British tar on modern roads. Prodorite, Ltd., illustrate the use of their product, Prodorite, for floors, process tanks, acid plant, etc. The British Oxygen Co. show various types of oxygen cutting machines, welding equipment, and miscellaneous fittings.

Company Formed to Insure Patents

The Patent Insurance Co., of Hartford, the first company of its kind in the United States, has received a certificate of incorporation from the state of Connecticut. Manufacturers, vendors, and patent owners may now protect themselves through regular policies of insurance against claims for infringement and be indemnified for damages, losses, and expenses arising from patent litigation. William S. Scheide, one of the incorporators, whose insurance experience covers more than forty years, has stated that a survey disclosed no hazards which could not be handled properly under the scientific principles and well-established practices of underwriting, and that the new company's policies provide the patent owner or licensee with a practical and economical means of defending his interests. The incorporation was carried out with capital funds of $400,000 paid in, but it is expected that before beginning business the company will have funds of $2,500,000.

The Ceylon Plumbago Industry

Mr. D. H. Hacking, M.P., Secretary to the Department of Overseas Trade, presided at a lecture at the Imperial Institute on Wednesday, February 13, by Mr. H. L. de Mel, on "Ceylon and its Plumbago Industry." Mr. de Mel said that the plumbago industry in Ceylon was fortunately situated in being able to work great beds of graphite. The labour force was happy and well looked after, and the physical development of the workers, who, as Buddhists, were vegetarians and touched no alcohol, was remarkable. Before the war Ceylon produced 80 per cent. of the world's supply of plumbago, but now had a keen competitor in Madagascar. Ceylon at present supplied 14,000 tons out of a total annual world production of 30,000 tons. For this commodity the United States and Germany were her best customers, the United Kingdom taking the third place.

Chemical Studies of Low Temperature Tar

A Lecture by Dr. G. T. Morgan, F.R.S.

At a meeting of the Glasgow section of the Society of Chemical Industry on Friday, February 15, Dr. G. T. Morgan gave an account of the work on low temperature tar which has recently been carried out at the Chemical Laboratory, Teddington, under his direction. An account of the lecture appears below.

DR. MORGAN said that the subject of his lecture was an outcome of recent developments in the destructive distillation of coal, a process which was first successfully effected on an industrial scale by a Scotsman, William Murdoch, whose method was employed to illuminate London by means of coal gas at the commencement of the nineteenth century. From that time until now coal had been carbonised at high temperature (1000 to 1300° C.), when it yielded illuminating gas, ammonacal liquor and tar, with a residue of coke.

High Temperature Tar

The tar from high temperature carbonisation proved to be the most abundant source of aromatic compounds, so called because they had formerly been obtained in small amounts from aromatic gums and resins such as gum benzoin and tolu balsam. From 1856 onwards, certain of these coal tar aromatics became of great commercial importance as starting materials in the manufacture of synthetic dyes, high explosives, drugs, perfumes, photographic materials and artificial resins. These fine chemicals were derived from some seven or eight coal tar products: Benzene, toluene, xylene, naphthalene, anthracene, phenol, cresol and carbazole. Distillation of the tar under atmospheric pressure was the procedure commonly adopted in order to obtain the technically important coal tar products. The process was carried out on a considerable scale—25 ton batches—and the crude products were purified by fractional distillations and by chemical means.

Side by side with this rational use of coal based on its conversion into gas and coke there persisted the irrational practice of burning raw coal both in domestic fires and in the factory, so that long before the end of the nineteenth century the pollution of the atmosphere by smoke arising from coal fires became so objectionable that serious attempts were made to abate the nuisance. One of these palliative measures consisted in converting coal into a smokeless fuel capable of being burnt without forced draught in an ordinary domestic grate. Such processes were grouped together under the general title of low temperature carbonisation. There were many modifications, and last summer he had had the privilege of inspecting the Dalmarnock works, where a low temperature process devised by Mr. Maclaurin was actually in operation on an extensive scale. This process furnished a smokeless fuel, "Kincole," of excellent quality, a gas of medium calorific value, an aqueous distillate containing ammonia and polyhydric phenols, and an oily distillate of low temperature tar worthy of detailed study.

The Chemical Research Laboratory, Teddington

When the Chemical Research Laboratory was instituted rather more than three years ago in order to study chemical problems of national importance, it was recognised that one promising line of investigation was a fundamental examination of the chemical constituents of low temperature tars, to be pursued in close collaboration with H.M. Fuel Research Station, Greenwich, where the carbonisation of coal and allied operations were carried out under rigorously controlled conditions. Their starting materials were "pedigree" tars capable at any time of duplication.

Starting with two chemists in 1926, the staff of the Laboratory had increased gradually to six chemists and three laboratory assistants. An important feature of the laboratory was a well-equipped workshop and an efficient workshop staff. A semi-works-scale laboratory had been constructed in which 20 to 30 gallons of tar could be handled with quantitative precision. The plant used for work on the tars represented the two fundamental principles underlying this work: The avoidance of high temperatures, and the systematic use of solvents.

Dr. Morgan showed slides of the plant. Gas-heated stills were generally employed in conjunction with rotary oil vacuum pumps, so that distillation could be effected under reduced pressure of two to four mm. of mercury. The solvent extraction plant included a semi-large-scale Soxhlet apparatus designed for the successive extraction of organic materials with two volatile solvents. Solvent extractions were also made in 20-gallon enamelled steam-heated stills. The pressure filter which was used to collect crystalline substance and precipitates could be either heated by steam or cooled by brine in both its upper and lower compartments.

Study of a Typical Low Temperature Tar

The tar chiefly studied was derived from a typical bituminous coal from the Kinneil six-foot seam in the Linlithgow coal-field. The coal had been carbonised in vertical retorts at 625° C.

The solvent method of treatment as applied to the Kinneil tar was as follows: The wet tar was gently heated to 120° C. in order to remove most of the mechanically-held water. During this dehydration a certain amount of light oil distilled over with the steam. The residual tar was clarified with ether and cooled, when it deposited inorganic impurities and wax of high melting point (60° C.). The ethereal solution was extracted successively with 5 per cent. aqueous caustic soda to remove phenolic and acidic constituents and with 5 per cent. sulphuric acid to remove the bases.

Neutral Constituents

Waxes.—The ether was removed by distillation from the tar and the latter again heated to 120° C. under 2 mm. pressure, when a second light oil was obtained as the distillate. The residual tar was mixed with acetone and cooled to 0° C., when a precipitate was obtained consisting of the major part of the wax, melting at about 53° C. Further refrigeration to –80° C. led to the separation of more fusible waxes melting from 10° to 20° C.

These waxes were not wholly saturated, for they had iodine and bromine numbers. The least fusible of the waxes were the most saturated, as indicated by the resistance to concentrated sulphuric acid. An X-ray examination of the harder waxes by Professor E. G. Owen, formerly of the National Physical Laboratory, had indicated the presence of hydrocarbons corresponding with C_{26} and C_{27} (synthetic $C_{27}H_{56}$, m.p. 58° C.).

The very fusible waxes obtained at low temperatures merged gradually into heavy oils which remained liquid at ordinary room temperatures.

Higher Aromatic Hydrocarbons.—High temperature tar contained many solid aromatic hydrocarbons—naphthalene, acenaphthene, fluorene, anthracene and phenanthrene. It was formerly thought that the absence of naphthalene was a characteristic of low temperature tar, but this hydrocarbon had been identified in the second light oil of low temperature Kinneil tar, together with β-methylnaphthalene. Both of these hydrocarbons were isolated through their picrates.

Anthracene Hydrocarbons.—A high-boiling product analogous to the green grease of high temperature tar was obtainable either by distillation or by solvent methods from low temperature tars, and when freed from waxes by systematic use of solvents—acetone and light petroleum—it yielded aromatic hydrocarbons belonging to the anthracene series.

These solid aromatic hydrocarbons were present in a very complex mixture in which β-methylanthracene had been identified with certainty. Crystallisations with various solvents—light petroleum, acetone, chloroform and carbon disulphide—had led to fractions which on oxidation yield the following quinones: Anthraquinone, β-methylanthraquinone, 2:6-dimethylanthraquinone and 2:7-dimethylanthraquinone. The presence of these quinones did not necessarily mean that the corresponding anthracenes were present in the tar, because during oxidation anthracenoid hydrocarbons having only substituents in the middle ring would lose their groups and give ordinary anthraquinone.

In addition to the anthracene derivatives, a golden yellow hydrocarbon had been isolated, melting at 320° C. It had not been studied systematically, but was possibly a naphthacene derivative.

Tar Resins or Resinenes.—The solvent treatment of low temperature tar led at various stages to the deposition of amorphous solids which were termed " ulmins " by previous investigators. Such deposits were often viscid, but by solution in suitable solvents followed by fractional precipitation by light petroleum they were converted into resinous solids. These neutral tar resins, to which they applied the name resinenes, were deposited from solution in tough adherent films on glass, wood and metal surfaces.

Tar Bases

The extraction of low temperature tar with dilute sulphuric acid led to the deposition of a small amount of resinenes, and the basic constituents passed into solution as sulphates and were again liberated by alkalis, being then divisible into three parts: Mobile oils soluble in petroleum; viscous oils insoluble in petroleum; and amorphous solids insoluble in petroleum.

The mobile oils were fractionated up to 100° C. under 2 mm. pressure, and the fractions examined in detail. Aniline was characterised through its benzoyl and toluene-*p*-sulphonyl derivatives. The tertiary bases were converted into crystalline mercurichlorides, B, HCl, $2HgCl_2$. In this way the following were identified: Pyridine, α-picoline, 2 : 4 and 2 : 6-lutidines (dimethylpyridines), and collidine (2 : 4 : 6-trimethylpyridine). A higher fraction of the tertiary bases yielded crystalline picrates, by means of which quinoline and quinaldine were identified.

The amorphous solid bases mentioned had the dual properties of resins and organic amines, and accordingly they had been called resinamines.

Alkali Extract of Low Temperature Tar

Low temperature tar contained a large proportion of materials extractable by aqueous caustic soda, but those materials were not all phenolic. Only a portion were true phenols; the remainder were soluble in the solution of alkaline phenolates.

The alkaline solution was carbonated by carbon dioxide and extracted with ether to free the crude phenols from amorphous solids. After distilling off the ether, the crude phenols were redissolved in 10 per cent. caustic soda and washed with chloroform; that solvent threw down a considerable precipitate containing resinamines, and extracted nearly all the remaining non-phenolic material. After removing the chloroform, the residue was extracted with light petroleum, which dissolved out a mobile oil.

The insoluble residue was extracted with ether; an insoluble resinene was left, and the extract gave a more soluble resinene on the addition of light petroleum.

The purified alkali extract when acidified yielded the true phenols, which were then treated with light petroleum, which dissolved the crystallisable phenols. The insoluble residue, when extracted with ether, left insoluble resinous phenols, and the ethereal extract when treated with light petroleum gave a crop of resinous phenols soluble in ether, and viscid tar acids. In this way the true phenols were separated into: (1) Crystallisable phenols; (2) Viscid tar acids, an intermediate group possibly resolvable into (1) and (2); and (3) Amorphous resinous phenols.

The name resinol had been adopted for the amorphous resinous phenols, since they were both resinous and phenolic. The resinols were insoluble in water, but dissolved in aqueous caustic soda to foaming solutions.

Carboxylic Acids

After liberating the true phenols with carbonic acid, the aqueous solution was acidified with mineral acid to liberate carboxylic acids. By the systematic use of solvents (ether and petroleum), the carboxylic acids were divisible into crystalline and colloidal acids, and for the latter the term resinoic acids was suggested.

Aqueous Liquors

A logical extension of the work on low temperature tar had led to an examination of the aqueous liquors which were also obtained during carbonisation. Dr. Morgan showed a picture of a plant (35 ft. high), representing an automatic extractor which worked continuously and enabled an aqueous solution to be extracted very efficiently with a partly miscible solvent such as ether. The solvent boiler was heated by a steam coiler, there were two solvent condensers, and the solvent container gave a head of liquid to force the solvent through the nozzles of the distributing pipe at the base of the extractor. The ethereal extract was carried through to the overflow pipe back to the boiler. An acid washer was introduced to take out any volatile bases such as pyridine. The ether dissolved in the aqueous solution could be driven out by the steam coil and condensed in the lower solvent condenser. The aqueous liquors contained only small amounts of organic bases (15 grams from 100 gallons of liquor). Pyridine and α-picoline were both identified.

The ethereal extract contained a considerable amount of phenols, which were distilled with water under reduced pressure and thus separated into mono- and poly-hydric phenols. Phenol itself was identified in the more volatile fraction, and catechol in the less volatile, to the extent of 0·1 per cent. of the aqueous liquor.

Comparison of Four Tars

The results hitherto discussed were obtained chiefly with tars from Kinneil coal, and also to some extent from tar derived from Balton Main coal, both being carbonised by the method developed at the Fuel Research Station. They had extended their extraction methods to tars obtained by other carbonisation processes, as for example the Maclaurin system of carbonisation in vertical retorts at 900-1,000° C., giving a tar of intermediate composition; and carbonisation in horizontal retorts at 1,200-1,350° C., yielding a typical high temperature tar.

Slides were shown illustrating the composition of the four tars obtained. The temperature of carbonisation ranged from 625° C. in the Fuel Research Process to 1,350° C. in the horizontal retort. The yield of tar diminished with the rise in temperature. The specific gravities of the intermediate and high temperature tars were higher than those of the low temperature tars. The percentage of pitch obtainable by distilling the tar to 360° C. was greatest in the high temperature tars.

As regards materials extracted by caustic soda, the percentage of total phenols diminished with rise of carbonisation temperature and the diminution was reflected in the three varieties of phenolic derivatives, crystalline phenols, tar acids and resinols. The non-phenolic extract decreased as the temperature of carbonisation rose, disappearing almost completely at the highest temperature. The carboxylic acids, both crystallisable and resinous, remained fairly constant with the four.

As regards naphthalene, which was a very minor constituent in the Fuel Research and Maclaurin tars, it became a major constituent of high temperature tar. The percentages for naphthalene given in some slides shown were minimum values, being hydrocarbon obtainable from the second light oil. In the lower tars its extraction was effected only by aid of its picrate. It was of interest that absence of naphthalene was formerly regarded as a characteristic of low temperature tar.

On the contrary, the waxes, which were important constituents of low temperature tar, tended to disappear as the temperature reached its maximum.

The bases remained fairly constant in the four tars. Resinamines persisted even at the highest temperature.

A Summary of the Results

Summing up the results of the work, Dr. Morgan said that by the solvent method of extraction about 1·6 per cent. of wax was obtainable from low temperature tar. It was readily bleached and of comparatively high melting point. Higher aromatic hydrocarbons amounted to more than 1 per cent. of the tar, and contained anthracene derivatives exidisable to anthraquinone and methylated anthraquinones, these products being potential intermediates for the colour industry.

The low temperature tars contained a relatively high percentage of phenols which could be freed from the tendency to redden on exposure. These and their chlorinated derivatives were germicidally very active. When condensed with formaldehyde the phenols yielded both fusible and infusible resins. The former were applicable as lacquers and varnishes, the latter, when mixed with fillers, could be used in making moulded articles, capable of being machined.

Crystallisable and Resinous Constituents

One outstanding result of the research on low temperature tar had been the recognition of two main divisions of solid derivatives, the crystallisable and the resinous materials.

This observation accorded with Thomas Graham's classification of substances into crystalloids and colloids. Just as there were mobile oils, bases, crystallisable phenols and crystallisable acids in the tar, so also were there present neutral resins or resinenes, basic resins or resamines, phenolic resins or resinols, and carboxylic resins or resinoic acids.

In each of the four classes of resins they had materials differing considerably in solubility, fusibility and colour, but in suitable organic media they furnished solutions which when applied to glass, wood, or metal surfaces left adherent films often possessing distinctive shades of colour. These resins formed a suitable basis for lacquers, stains and polishes. The resins also possessed considerable binding power, and when heated and compressed with suitable fillers gave rise to moulded articles.

The resins, when mixed with coal dust, conferred briquetting properties on it. Hence the resins were probably related to the substances which gave to coal its caking properties. A study of the resins might therefore throw additional light on the original composition of coal.

The comparative study of the four tars was to be regarded as an introductory research, as it was believed that the solvent method afforded a means of making a fundamental investigation into the original constituents of tars in general, that is to say, tars derived not only from coal but also from all other carbonaceous fuel.

The Ostwald Colour System

A Paper Before the Dyers and Colourists at Manchester

A JOINT meeting of the Manchester Section of the Society of Dyers and Colourists and the Manchester Section of the Oil and Colour Chemists' Association was held on Friday, February 15. Mr. T. H. Bridge presided.

A paper, entitled "The Ostwald Colour System," was read by Mr. F. Scholefield, M.Sc., F.I.C. He stated that whatever we saw consisted essentially of colour spread over the field of vision in larger or smaller patches. The junction of two or more patches gave rise to lines of demarcation or boundaries, and it was the relation of boundary lines of colour distribution which created primarily the sense of form from which was to be inferred the existence of visible things. Colour was, therefore, fundamental to the sense of sight. The study of colour was rightly a branch of psychology, and in recent times this branch of knowledge had been vigorously pursued by psychologists. It was, perhaps, unfortunate that the word colour was used to denote not only the sensation, but also the material (colouring matter) by which the sensation was produced. The energy which by its effect on the eye produced colour was, of course, light.

Two Classes of Colour

Ostwald divided colours into two classes: (1) White, grey, black, and all which lay between them; and (2) The colours yellow, red, blue, green, and all which lay between or near them. The first class of colour Ostwald called *unbunt*, and the second class *bunt*, these words, freely translated, meaning unhued and hued respectively. Mr. Scholefield stated that throughout the paper he himself used the word colour in the wider sense of covering both the hued and the unhued types.

The *unbunt* or unhued colours formed a continuous simple or one-dimensional series with black and white as end-members. Between these two limits, all grey colours could be arranged to assume definite precise positions between their neighbours. Between any two different greys a third could always be interposed which was lighter than the one and darker than the other. In this way, the steps or gradations from one colour to the next could be made smaller and smaller until they were finally indistinguishable. The complete grey-series was therefore continuous. Hence, it would appear that the complete grey-series consisted of an infinite number of members. If, however, there were interposed between the two ends of the series a number of grey-coloured sheets, each of which was only just perceptibly lighter than the last, it would be found that the number interposable was not by any means infinite. Further, there was a limiting difference between any two, below which it was not possible to detect any difference. This limit of just detectable difference was known as the *schwelle* or the threshold. The existence of the threshold made it possible to speak of two greys as being identical—namely, those which could not be differentiated—but the threshold had no absolute value, as it varied with the person, and the individual person was himself affected by training, fatigue, etc.

Luminosity

The luminosity of a surface was the fraction of the incident light reflected from the surface. If all the light was reflected in all directions the colour was called white; if none was reflected it was called black; while if a portion was reflected the surface was grey. This was true when the surface absorbed or reflected all kinds of light equally; if it acted selectively, so that certain kinds of light were reflected more abundantly than others, the colour of the surface was neither white nor grey, but hued. The ideal white (the nearest being, say, barium sulphate) had, of course, a luminosity of 100. Zinc white might be 95, and chalk about 80. Every grey might be designated according to the amount of light it reflected, expressed in fractions of 100.

All existing colours contained a certain amount of white and black. The hued colours formed, like the unhued, a continuous series. The unhued series possessed two definite end points, white and black. The hued series possessed no such beginning and end. A beginning might be made with any colour and its neighbours found. After an increasing dissimilarity, there was an increasing similarity to the hue begun with. Consequently, it was most convenient to represent the series as a circle. Any point in the circle might be selected to begin numbering the colours. The direction of progress or continuation was also purely arbitrary.

Like the grey series, the colour circle was continuous. It was possible to insert between any two hued colours a third which was more nearly similar to the two colours than these were to each other, and this process might be continued until no difference could be distinguished any longer. The colours were then similar, or equal, or identical. There was also, again, a threshold for the sensation of variation, below which no objective difference could be experienced. It was, therefore, possible to have a quite continuous colour circle, *i.e.*, one in which it was not possible to distinguish between adjacent colours. The required number of colours in the circle for this continuity was about 300. For every colour in the colour circle there was another which differed most greatly from it. The circle was, in fact, compact of such pairs of opposite colours, and it was so arranged that those pairs occupied positions at the extreme points of the diameters.

Hue or Tone

A phenomenon which was unknown in the grey range occurred in every mixed colour, in that the quality of hue or tone was less conspicuous than in the components; the mixed colour was flatter or less pure. This change was the greater, the greater the distance between the two colours in the circle. Ultimately, a pair was reached which on mixing gave a pure grey. These were the dissimilar or complementary colours, which by this method might be accurately determined. Complementary colours were those colours which on being optically mixed yielded a neutral grey, such as yellow—ultramarine blue; orange—ice blue; red—sea green; and violet—leaf green. These were the eight principal colours; the primary colours being yellow, ultramarine blue, red, and sea green.

By means of a hundred-member circle and the preparation of an isochromatic triangle Mr. Scholefield demonstrated, in detail, the results of colour mixings and a method of establishing standard hues, and also explained a method of calculation by the employment of a colour equation.

According to Ostwald, those colours harmonised which were related by some law, namely, where some order existed. If this condition was absent the colours created either an unpleasant or a neutral impression. To find all the possible harmonies, every possible order or arrangement must be searched for in the colour-body. So far two principal arrangements had been found—equivalent colour circles and the isochromatic triangle. The equivalent colour circles gave harmonies of different hues, and the isochromatic triangle gave harmonies of the same hue.

The Development of Fast Dyeing and Dyes

The Full Story of Mr. James Morton's Enterprise

THERE was a full audience in the hall of the Royal Society of Arts, London, on Wednesday evening (with Professor H. E. Armstrong in the chair) to hear a remarkable paper by Mr. James Morton (of Morton Sundour Fabrics, Ltd., and Scottish Dyes, Ltd.), on "The History of the Development of Fast Dyeing and Dyes." The audience, too, was representative of many different interests touched by the subject. The chemical fraternity naturally predominated, and their views were expressed by Mr. H. T. Tizard, Secretary of the Department of Scientific and Industrial Research, and others. But there were also present representatives of the furnishing fabrics industry, like Mr. George Baker (of G. P. and J. Baker); several buyers from London houses; Mr. Dugdale, colour adviser to Tootal Broadhurst and Co., and the artist whose portrait of Professor Armstrong was exhibited at the Royal Academy of 1927; Professor Tom Jones, assistant secretary to the Cabinet, an early friend of Mr. Morton in his Glasgow days, who introduced to him Dr. John Thomas, the head of his research staff; Mr. Percy Watkins, secretary of the Welsh Department of the Board of Education; and others.

Mr. Morton's paper, though he "cut" many passages, occupied nearly an hour and a half. Read in an unemotional and matter-of-fact way, as if the author were quite unconscious of the great technical achievements he was recording, it produced a great impression and elicited tributes of a convincing character. A pleasant incident was when Professor Tom Jones, referring to the research chemist, who had been mentioned so often, asked that the chemist should stand up and let them see him. The inquiry disclosed Dr. Thomas, looking very youthful, among some colleagues on a back seat, and he was with difficulty induced to stand up and blush for about half a second!

Professor Armstrong's Tribute

At the outset Professor Armstrong called upon Mr. Morton without any word of introduction, but immediately the lecture ended he rose and paid him a noble and characteristic tribute—a master's tribute to a master's work.

"There is no one, probably," said Professor Armstrong, "to whom Mr. Morton's address can have the significance that it has to me. The man from whom all these blessings flow—Hofmann—was my first master in chemistry. . . .I have known all the chief actors in the great colour drama; a more brilliant intellectual band could not be. Beginning work in the year in which, through Kekulé's inspired genius, Benzene became a living soul, I can overlook an astounding field of discovery. The romance of the story is beyond words: one almost transcending imagination. Moreover, it is all absolute, solid fact, registered in terms of most wonderful colour, capped by Jade Green. The world struts in our colour, but has no understanding of our work. We chemists are a small class apart, content with the content of true achievement, which is ever the best reward, above and apart from any praise or payment.

"Mr. Morton has a rich reward, I feel sure, in the knowledge of his brilliant success—in addition to the material ways in which the world is showing approval of his work. No man has better reason to be proud of his success: he has won it, because he has been qualified for the work and with calculated means. Dour—however we pronounce it—is a word associated with the Scot. He tells us it means stubborn or hard to move. Maybe! In this case, it has meant hard at the attack. Throughout his career, he has gone steadily forward, always improving.

"His success in the chemical field recalls that of Perkin. Perkin is always vaunted as the discoverer of the first artificial dyestuff, Mauve. The discovery was sheer accident—there was nothing in it. His greatness lay in recognising his opportunity and entering upon the astounding task of founding an industry—when a youth of nineteen: still more in succeeding. . . . Perkin led the world into fields of loveliness undreamt of before his time, but he made only a modest commercial success of his beautiful foundling and its far more stalwart, light-fast pigmentary relatives. He was too narrowly educated, too inexperienced in the world, he had no helpers; he lacked the vision to develop and expand his business to the extent necessary to meet the growing competition. He had stolen a march on Graebe, but German commercial-scientific solidarity was eventually too much for him. . . .

"There is more than something of the prophet in Mr. Morton. He looks the part: you can imagine him preaching a gospel in a Scotch kirk. He has magic personality—the power of attracting disciples to be and remain not merely his fellow workers but one with himself in a passionate determination to carry their mission to success. His was a more difficult task than Perkin's. He was called on to do more difficult things, at a time when everything was difficult. Still, he had an organisation at his command and faithful assistants. He, too, is full of wit. That he has business ability is clear. He also has complete technical command of the textile and dyeing industry. I will not say that he understood dye-stuff making technically—I don't suppose he could answer a question in an examination—but he is in complete sympathy with its problems, its methods, and its difficulties. Obviously he, too, has the research spirit within him; his study of fading is proof. In addition, he is a man of high artistic feeling and culture. He has scoured the world in search of colour patterns. Go to his museum in Carlisle, and you will see a wonderful collection.

"Now let me pay him my highest compliment. He has the qualities of the best type of German industrial leader. Nothing struck me more, as a youth, when a student in Leipzig, than the cultured intelligence, largely derived from the University, of the German business man. I had the entry to several houses. I met with nothing of the kind on my return here, and have rarely met with it here in the interval—except in a house like that of the late Dr. Mond. Dr. Mond made his industry a great success. German industry has always been in the hands of technically qualified directorates. We have too often courted aristocratic failure. The dyestuff industry was a failure here from the time of Perkin up to the war, because it was never in the hands of business men of sufficient intellectual calibre, culture, and sympathy. We shall hold our fair share of the industry only so long as such men have charge of its ways and means. Chemists may come, chemists may go, they are indispensable: a wide charity must also be operative to make an industry succeed.

"I have felt it a great privilege during the past dozen years to have had Mr. Morton as a friend: to me he has been an intensely interesting study. To chemists he brings a lesson of the greatest consequence. We might have played our part at any time. Some of us have long held that English failure to maintain an organic chemical industry was due to lack of leadership on the commercial side, to lack of intelligence in our business men. Mr. Morton has proved this to demonstration—but in so doing he has given us warning. He has developed only a section of the industry. The larger section has been encouraged into a passing prosperity by entirely artificial means. No mere combine can sustain it. Complete and undivided technical efficiency of management alone will secure its continued success. For us chemists, it is an anxious time: we are accustomed to weigh and measure and are not without ability to read even a commercial barometer."

Mr. Tizard and Others

Mr. Tizard, who was asked to open the discussion, said they had listened to a magnificent record of one of the most magnificent achievements of modern times. One of the most remarkable statements was that during the two slump years after the war Mr. Morton did not dispense with the services of a single chemist; if they were not needed for production they could continue research, and it was satisfactory to know that their research had proved so fruitful.

Mr. George Baker, an old commercial friend of Mr. Morton, said that after listening to his wonderful paper, constituting a romance of achievement, he admired him more than ever.

Mr. Dugdale said that as a pioneer of fast colours Mr. Morton had done very valuable service to the textile trade. Scottish Dyes saved the country from that point of view during and after the war, and but for the man at the wheel they might have been very badly wrecked.

Professor Tom Jones added an expression of his regard for Mr. Morton's great achievement and personal qualities.

Mr. Morton, in replying, remarked that he felt as if he had been reading the morning's papers the day after his death, when it was usual to say kind things about people. He proposed a vote of thanks to Professor Armstrong, whose friendship and encouragement had been a great help, and with this the meeting closed.

How the Quest for Fast Colours Began

Text of Mr. Morton's Paper

We give below the first instalment of Mr. Morton's paper, which will be continued in subsequent issues. The present instalment carries the story up to the outbreak of war in 1914.

TEXTILES are a world of their own, and it is only those who have been directly concerned with their production or distribution who can know the inner history concerning them. But even the lay-man or woman knows that within the past two decades what is practically a world-wide revolution has taken place in the standard of colour as applied to woven fabrics. As late as 1900 there was absolutely no standard of fastness for colour in textiles. These were made, and sold and bought, not expected to last in colour, for it had grown to be taken for granted that somehow things could not be otherwise. What do we find to-day? The public have been educated to a standard totally different, and have been led to expect and demand the colours of their fabrics to be as sound as the fibres of which they are made—a tremendous revolution in this special sphere within so short a period.

Some manufacturers and distributors have questioned the commercial wisdom of raising the standard to so high a level and of offering guarantees for fastness of colour in ordinary textiles; and as I am the original sinner, perhaps it is fitting that I should shoulder the responsibility and give the story of how it all came about. If what I have to say is largely of a personal character, or has reference mainly to our business, I know you will excuse it, for I gather it is this personal experience and development that is the origin of my being invited to give a paper before this ancient and learned Society.

The Story of Colour Fastness

The story is a very simple one. Our firm had been makers of furnishing fabrics for some thirty or forty years—curtains, upholstery fabrics, carpets and such like. About 1902, after we moved a branch of our works from Ayrshire to Carlisle, I had been interesting myself in the making of certain special tapestries. We did not then do our own dyeing, but got what was the best general service of the trade from old-established dyers, and I was responsible for the colouring of these tapestries. One day in Regent Street, London, I happened to be making the usual survey of Liberty's windows, and these particular tapestries caught my eye. But they had changed so radically I scarcely recognised my own handiwork. Certain colours had gone so much that the balance of my schemes had been completely upset, and I went in to enquire what had happened to these goods. I was told they had been in the window for only about a week. Here, indeed, was a revelation to me. I had no idea that we were being supplied with colours that were so fugitive, and I made a resolution. What was the good, I argued, of using valuable materials and of spending time over carefully considered colour schemes if in practice everything was to be upset by a week's exposure to ordinary sunshine, the very purpose for which the goods were made. If this could not be remedied I felt I should want to look out for a new job.

But I must first learn whether we were unique in our position, and whether there were not other fabrics on the market that behaved differently from ours on exposure. So I stayed in London a few days longer, and collected from friends in the trade, manufacturers' sample books of fabrics of all kinds—velvets, tapestries, damasks, dress goods, window Hollands—the productions of our own country, of Germany, France, and whatever came into the London markets. So I went home with parcels of books representing many hundreds, probably thousands, of the existing colours of all classes of fabrics, chiefly cottons, mercerised cottons, linens and some silks.

Experiments in a Greenhouse

Our home was then on Beacon Hill at Penrith, and our gardener had just filled a new greenhouse with young tomato plants on the side of a sunny hill. To his chagrin next morning I told him that I was afraid I would have to upset his plants for I wanted complete possession of that glasshouse. So I had those many hundreds of colours duly mounted on cards with their surfaces half-covered and exposed, and a warm humid atmosphere maintained. Our own fabrics were exposed with the others, and I should soon see what was the state of the colour element in fabrics as they were being supplied to the trade of the day. The result was most staggering. In many cases quite deep shades, on expensive velvets, for example, became almost white in a week. Careful notes were made on every card at stated periods, but in a few weeks there was not much more to record—it was a veritable "Flodden Field," with the "Flowers o' the Forest a' wede awa.'." Only a very few of that vast array held up any head at all after a few weeks' exposure. It was indeed a revelation.

As I have said, we did not then dye our own yarns, and I was to a great extent then ignorant of the composition of the dyes used; but it was evident that the whole colour side of our industry was in a hopelessly demoralised condition and that dyers supplied and manufacturers and merchants were willing to accept anything that coloured a fibre or a fabric, regardless altogether of its behaviour afterwards. This was without any question the condition of things at the time I am now speaking of on practically all fabrics composed of vegetable fibre, a most humiliating position for anyone who had respect for his trade or any real interest in the goods he was making, and surely most unfair to the public who were his ultimate customers. So I determined to attack this state of affairs—a big job enough as you can imagine. But what was there to go upon?

Looking at the débris of fallen colours one here and there stood out. Certain elements in others seemed to be fairly sound. I must get to know just what types of dyes these were, and whether we could begin to build on these as a foundation.

How the Quest for Fastness Began

While making this survey of colours it so happened that I was working at the time on a new combined weaving and printing process in which I required the use of certain coloured yarns that would stand an after-resist printing process. In this respect the representative of a certain Scotch firm brought to me some pinks. "Blush Pinks," he called them, which he affirmed would "stand anything." I doubted the statement very much, especially with the experience I was just having in my tomato house (and as a matter of fact, the blush of the pinks did prove somewhat evanescent). But the phrase "stand anything" caught my imagination, and the idea flashed on my mind—I can remember the very spot still—what if it were possible to get colours, even some colours, that would "stand anything." What a splendid triumph it would be, and what words to go to the trade with against all that array of mock dyes that was obviously holding the field at the present day. So I set my face towards that without delay.

In the firm whom this traveller represented I learned of a young colour chemist, son of the head of the concern. I sought him out, and unfolded to him the scheme I had in my mind. I took him to see my "Flodden Field," with its few

survivals, and we then began a long constructive campaign that has, I think it will be admitted, left its permanent impression on the textile trade of the world. This was in 1903.

My scheme was to arrive at a range of colours, even a small range, that could be absolutely relied upon, or as nearly absolute as practical purposes could expect, and make from them certain types of fabrics that we would be prepared to guarantee against fading from sunlight or from ordinary washing. So we set about dyeing many hundreds of colours in every conceivable way that would tend to secure fastness. These we exposed and tested diligently week by week, and month by month, learning as we went along. After a certain number had given promise of the necessary qualities, I made up cards of those, which I sent to a friend in India to be exposed on the roof of his house in the Punjab. I made up several sets of those cards, having alongside them corresponding shades of ordinary dyes, with instructions that they were all to be exposed uniformly, and one of the sets was to be returned to me after the expiry of each month. This gave me the behaviour of each group from one to several months' exposure under the blazing sun of India, while at the same time we were having similar tests under our own climatic conditions. From these tests I was able by the summer of 1904 to get as many reliable colours as formed a quite respectable palette, and by the autumn of that year we had then made into tapestries that were put on the market with a guarantee that any goods fading or failing to stand ordinary laundry wash would be at once replaced. That, I believe, was the first time in the history of textiles that such a guarantee had been given, and it made a great impression in that particular department of the trade.

To give the even proper prominence, and possibly to satisfy a certain Scotch caution, I thought it advisable that those goods should be handled and announced at first by one prominent distributor only, and on putting the matter before the directors of Messrs. Liberty in London, they at once grasped the significance and value of the idea. So that these guaranteed goods were first announced and sold by that firm in the autumn of 1904, and we gave them the monopoly for this country for a certain term.

The First of the Vat Colours

It is interesting now to look back on that modest palette, and those of you who know anything of the history of dyes must wonder how we could launch on such a venture at that early date. But the alizarines were good friends in those days, and if kept deep enough in shade, and dyed with care and real knowledge, they could be relied on for reds, deep wine colours, and such like. Then we had to recognise the value of some of the old mineral colouring matter which gave us some buffs and light browns that were very useful. But what about blues and greens? For indigo on vegetable fibre we found to be far short of the standard that would justify any sort of guarantee. Our rescue in this direction came from a quite new source. As you chemists will remember, it was just at this time that the first of the vat colours were being put on the market—indanthrene blue and yellow, also a grey. These proved the saviours of our scheme, and but for them we should have had to be content with a very limited and uninteresting palette indeed. But even here it was by no means plain sailing. Vat dyes were new and very sensitive and difficult to apply with any degree of levelness that would be suitable for our types of cloth. They had never been used in commercial bulk anywhere, and in our own country practically not at all, and their manipulation was a piece of interesting new work.

But to proceed with our story. This elaborately tested and selected range of colours was dyed on yarns for us by a firm or firms of dyers in Scotland under special agreement. They were woven into fabrics on our looms in Carlisle, mainly tapesties of cotton, mercerised cotton and linen, with some special colours in wool that we could absolutely rely upon. And thus was launched this first ship of our new venture. It met with immediate response. The colours stood up to all that we had claimed for them, and in due time our first goal had been reached, for we had got to the ear of the public the fact that it was possible to obtain textiles that could really be relied upon for colour fastness.

But the problem of marketing on a broader scale soon claimed our attention. As I have already mentioned, we had had the great advantage of having our message proclaimed first by the firm of Liberty, and it was a valuable platform from which to make such an important new announcement. It brought the fabrics into much prominence, and aroused the curiosity, if not the covetousness, of other buyers, both at home and abroad. But the fabrics for this firm, especially at the time of which I speak, were necessarily of an exclusive type, and appealed to a clientele where the price factor was not of such importance. But this also meant a necessarily limited trade. So when our term of monopoly expired and we set out to cater for a more general trade, price had obviously to play a much more important part. The great problem now was whether we could convince the general buyer and the general public sufficiently of the soundness and value of the fast dyes that they would be prepared to pay the very considerable extra price. We must study the science of selling. So we decided that a brand or trade mark must be had by which our goods would be known, and a campaign of preaching and publicity would be necessary before the fabrics could be generally accepted as the standard of the trade. So we invented our trade mark of *Sundour*, made up of the word "Sun" and "dour," the latter an old Gaelic word meaning water, and also in Scotch meaning stubborn or hard to move. And in our publicity work we found of tremendous help those exposures that had been so exhaustively made. Our printer friends in Carlisle made a most useful coloured lithograph of those cards of exposure whereby we could show at a glance the comparative result of ordinary dyes and our *Sundour* dyes, the former showing almost white in three weeks, while the *Sundours* had stood firm at the end of their seven months' exposure.

The Gospel of Fast Colours

It was essential, as you will realise, to have some visible and tangible proof of value, for you must remember that we had to ask about 50 per cent. higher price for fabrics that looked just the same to begin with as the fabrics with which they were competing. It was indeed asking much good faith on the part of the buyers. But our firm had behind it a long-standing reputation for reliable goods—thanks to the work of our fathers. There was also already behind them about two years' history of these guaranteed fabrics with a firm of repute, and it was at this time that I made an exhaustive tour personally among our customers throughout this country as well as from the East to the West of Canada and from the West to the Eastern States of America. It was the first missionary tour on the gospel of fast colours. I had with me specimens of my special exposures as a visible object lesson, also numbers of washing tests. The reality of the new factor got home to the buyers, and from that time the growth has been what you all know it. Within a year or so we had not only all our own available looms occupied on fabrics made with these fast dyed yarns, but we had many scores of looms working for us on commission.

The Science of Applying Vat Dyes

Up to this time we had only tackled the dyeing of those special colours on yarns for cloths that we had become more or less identified with, and by this time I felt that we were, perhaps, reaching the limit of the trade that could be done in this particular field—mainly tapestries and fancy types of hangings. But at that time there was a great demand for plain dyed piece goods. It was a business of very great volume in Lancashire, and I felt that if we could adapt our special features to this particular branch it would enable us to tap the grey cloth production of Lancashire and give us fabrics on a much lower basis of cost that would appeal to a vastly greater public. In the meantime, stimulated, as I think the makers in Germany would willingly admit, by the market we had helped to create for them, the scope of dyes of the vat type had greatly increased; but their application had been confined to yarns, and I realised the enormous value that would accrue if they could be applied to the vast grey piece trade. This involved a set of problems that had never yet been tackled, and it is here that a new chapter in our story begins.

These problems were of a kind that could not be undertaken by our friends in Scotland who had been dyeing our yarns, so I decided that we should make these new developments in dyeing within our own works at Carlisle. This involved the starting of a chemical side of our business, and was in the

year 1909. As a preliminary, I visited personally the principals of our three main technical colleges—Leeds, Bradford and Manchester—stated my problem, and asked for their recommendation, from among their present or past students that might be available for our important post. It was an interesting and instructive time, and I ultimately fixed on the recommendation of Dr. Knecht of Manchester, in the person of Dr. Teltscher, a graduate of Heidelberg University, who, besides having taken his Ph.D. there in pure science, had taken a tinctorial and textile course at Manchester, as well as a short similar course in Germany. He became known to many in Carlisle, and delivered several interesting scientific papers there, and was an active and interesting personality among us till he left for Vienna on the Sunday before the outbreak of war.

With his collaboration we ultimately worked out a special process for the application of vat and other colours to plain cloth, first from laboratory models, which we afterwards developed into works' plant from our own drawings, and from which we dyed and issued from our own works in Carlisle the first whole or plain vat dyed goods in this country, and the first practical production of its kind, I believe, in any country, for Germany had no. yet got to the stage of applying these colours in that form.

The introduction of these plain dyed fabrics made a much greater impression on the market than anything we had done before. Orders rolled in and the machines went up till we began to be felt by the big Lancashire and Yorkshire makers. And when they realised that the road we had taken did not seem to be leading to utter destruction they began to offer us a little of their company, so that to a small extent before 1914, and in a much greater degree during these later years, we have got many companions on the way, here, and even more largely in America, each decorated with his own peculiar badge or banner, as like the original as they could go—the word "Sun" or "Sol" or "Dour," with every variety of prefix and affix, but none of them just the plain *Sundour*. From a perusal of the trade papers one would indeed think we had become a people of sun worshippers!

The Importance of Reputation

By 1914, though we had had a progressive business in many departments of textiles for some forty or fifty years, this section of *Sundour* had become by far the largest and not the least lucrative. And what about reputation? How had the guarantee fared? This is most interesting. At first we felt that it would be only prudent to lay aside a certain reserve out of profits against goods that were going out in such quantities with a guarantee for every yard, but after the first two years we found that this was entirely unnecessary. I do not say we had no complaints, for much may happen where so many operations are subject to the human factor; but our tests were so rigid, and our decision to use at all times only the best known procurable dyes by the best known processes regardless of cost was so effective, that the percentage of misfits in a year was so infinitesimal as to be quite negligible. As to reputation, I could read many letters that came to us from all parts of the globe testifying to the wonderful behaviour of our fabrics. They were a great encouragement to us in those early days.

It may be of interest to tell that in the famous Army manœuvres in Germany in 1913, the capes and caps of the Emperor, his sons and Field Marshals, were all made of *Sundour* material dyed and woven at our works in Carlisle, and supplied by Messrs. Burberry, because they had been found to stand their most rigorous weather tests.

A German Incident

Just one other incident also relating to Germany, which I must give at this stage, mainly because of a rather interesting sequel, but which does not come until much later in my story. We were on very good business terms with the German dyemakers, and in the vat section would be by far the largest customers in this country. We had collaborated with them a good deal with a view to getting materials that would meet our very special requirements. In the autumn of 1913 there was an important new phase that I was keen to develop, so it was arranged that I would spend some time over there with our head chemist in order to go through some experiments, and we had a most interesting trip. Our time, I may say, was all spent in the application laboratories, the actual manufacturing sheds being sacrosanct. At the Badische works at Ludwigshafen we had a specially interesting time, and as it was from these works that we had been drawing most of our supplies during all those years my name and our affairs seemed to be somewhat well known to them, and they had by them many specimens of our productions as a matter of technical interest. In showing us round their Hall of Honour, Dr. Bohn, I think it was, pointed to an empty niche in the gallery, and in a jocular way explained that that niche was being reserved for Mr. Morton, as they recognised it was to him more than anyone living that they were indebted for the commercial development of these vat colours—a nice little jocular compliment with a sequel which, as I have said, you will hear of later on. I took the results of the experiments of our sojourn home with me. They were going through their usual tests, and for the next few months we were preparing for this new development. The holidays of July came, and then it was the August of 1914 and—the scene was changed.

[The remainder of the paper will be published in our forthcoming issues. It describes, when the outbreak of war cut off the supplies of fast dyes, the remarkable efforts and experiments by which Mr. Morton succeeded first in producing a few vat dyes for his own use, in developing the vat dye industry in this country, in producing world-famous colours such as Caledon Jade Green and Solvay Blue, in discovering a soluble anthraquinone vat colour, and in taking the lead of even Germany in certain fields of dyestuff research and production.]

Canada's Copper and Nickel Exports

ACCORDING to figures just issued by the Dominion Bureau of Statistics at Ottawa, Canada's exports of copper in December were more than double those recorded for December, 1927, having exceeded 20,000,000 lb. The quantity of blister copper exported was 12,895,500 lb., valued at $2,008,516, compared with 8,786,200 lb. in November, valued at $1,344,334, and 4,185,600 lb., worth $536,773, in December, 1927. Including copper in ore, matte, regulus, etc., the total amount of copper exported from Canada in December, 1928, was 20,574,800 lb., valued at $2,752,184, compared with 14,852,100 lb., valued at $1,880,422, in November, and 9,456,500 lb., worth £1,014,908, in December, 1927.

Exports of fine nickel in December were also more than twice as large as in the same month of 1927, 5,372,300 lb. in December, 1928, comparing with 5,081,800 lb. in November and 2,546,200 lb. in December, 1927. Including nickel oxide and nickel in ore, matte or speiss, the total quantity of nickel exported in December was 7,912,300 lb., valued at $1,992,961, compared with 9,440,500 lb., worth $2,106,026 in November and 6,907,700 lb., valued at $1,426,473, in December, 1927.

American Influence on Italian Industry

THE latest European industry to submit to the peaceful penetration of American industrial methods and financial aid is Italy's leading heavy machinery-making concern, the Breda Co. After studying and adopting the technique of United States works, the Breda concern is now looking to America for capital to finance its development, and has arranged for a $5,000,000 loan to be issued shortly by Dillon Read and Co., the New York bankers. So well has the Italian company learnt from American technical methods that it recently beat its teachers, as well as German and British competitors, in tendering for locomotive contracts for the Egyptian and South African railways. It has gone to the limit of modernity in erecting its own airport, and manufactures aeroplanes which play a large part in the Italian Government's aviation schemes.

United States Chemical Tariff Demands

DR. CHARLES H. HERTY appealed to the Ways and Means Committee at the recent sitting of the United States Tariff Commission, on behalf of the Rossler and Hasslacher Chemical Co., from a U.S. Treasury Department ruling putting sodium on the free list as a metal. He admitted that technically sodium was a metal and an element, but declared that its uses were chemical and that it should be so rated for Customs purposes. He and J. C. Swain, of Washington, asked that it be named specifically in the pending Bill and be assured of a 25 per cent. *ad valorem* duty. Asked about duties on chemicals generally, Dr. Herty said that the tariff was their only answer to the German cartel.

The Prince of Wales' Speech

Mr. Woolcock's Reply

REPLYING on behalf of the London exhibitors to the Prince of Wales's speech at the Mansion House dinner on Monday evening in connection with the British Industries Fair, Mr. W. J. U. Woolcock said :—

" The Prime Minister, speaking as he does on these occasions not on behalf of any party or any class of the community but for us all, has adequately and in his own inimitable style replied to the very stimulating speech of His Royal Highness in proposing this toast. It remains for me to touch on one or two domestic matters. First, I would like on behalf of the exhibitors in the London Section to congratulate our fellow exhibitors at Birmingham. They showed great courage and initiative, and did not hesitate to build on an ambitious scale and they have reaped a well-deserved reward.

" Of the London Fair it can be said that in its 15 years' existence the number of exhibitors has increased two and a half times, and the space occupied to-day is more than three times as large as that occupied in 1915. This is a remarkable development, and the Fair has now created for itself a permanent position among the great annual commercial events.

" The limitations of the present buildings are obvious to everybody and I must confess to a good deal of sympathy with the Department of Overseas Trade in the problem with which they have to cope at the White City. When these difficulties are added to by the extraordinary weather we are experiencing at present, the lot of the officials is indeed not a happy one. It is partly their own fault ; they are chosen in the first place for their tact. Then this quality is developed and increased in a way that is not possible in all branches of the Civil Service, by their constant association with the business community. Having set themselves this very high standard, they have to live up to it. They certainly have been very highly tried during the past week—it has been a little cold at the White City. Irate householders, without a drop of water in the house, whose gas was poor and whose fuses were blown, emerged last week from this chrysalis stage into that of the butterfly exhibitor. Such is their touching faith in the officials, they expect to find the White City warm and cosy and water running freely—a wonderful tribute to the officials ! Notwithstanding all these difficulties here we are to-day with the Fair in full swing.

" One would like in a few sentences to try to interpret the lesson of to-day's Fair. As I see it, it illustrates that spirit of inquiry which fortunately is abroad in the land. Turn where you will, you find it—in the Mond-Turner conversations, and inquiry by employer and employed as to what co-operation is possible ; in the realm of political economics a desire to abandon doctrines which never had the sanction of Holy Writ and to raise such questions as that of safeguarding beyond the sphere of party politics into an atmosphere of rational inquiry. Or consider the Committee on Salesmanship appointed by the President of the Board of Education and presided over by my friend, Mr. Goodenough—here again you have the spirit of inquiry touching another section of industry.

" My Lords and Gentlemen, I venture to suggest that the reason why the nation's shop window at the White City and in Birmingham is larger and better stocked and the shop has more customers in it is because the business community to-day has this ever-growing spirit of inquiry. In fostering that spirit your Royal Highness has played a great and worthy part and among the contributions you have made, none has been more helpful, none more encouraging, than the speech to which we have listened with much pleasure to-night. On behalf of the London exhibitors I tender your Royal Highness our most hearty thanks."

Lord Birkenhead's Latest Post

THE Earl of Birkenhead, already a director of Imperial Chemical Industries, has accepted the chairmanship of the Greater London and Counties Trust, Ltd., which controls seven British electricity concerns. The ordinary shares of the Trust have been acquired by an American concern, the Utility Power and Light Corporation, but Lord Birkenhead has stated that the directors and staff of the Trust are, and will remain, British.

Road Tar Conference

Meeting of the Northern Surveyors

SURVEYORS of the North Riding of Yorkshire, Durham and Northumberland attended a luncheon and conference held at Newcastle on Thursday, February 14, under the auspices of the Northern District Tar Board of the British Road Tar Association.

The chair was taken by Mr. J. A. Roelofsen, chairman of the district board, and in extending a welcome to the guests he said all road engineers and surveyors had used tar in various forms on the roads, but there were a number who had used other preparations, and it was with a view to ascertaining the wishes of the surveyors, and of discussing the best form of road binder, that the surveyors had been invited that day.

Mr. T. P. Ridley, vice-chairman of the district board, said that during 1929 the expenditure on roads would be in the region of 60 million pounds. It did not matter what proportion of that sum came out of the Road Fund, and what came from the ratepayers ; in the end the money was obtained from British purses, and the Road Tar Board was of opinion that British money should be spent on British material as far as possible. In the northern district they went further, and said that material should be bought locally with local money, because the more they helped the tar trade the more they helped the coal trade and the half-million consumers of gas, since the price of gas depended on the price realised for residuals.

Road Tar v. Bitumen

It seemed extraordinary that they should import bitumen for roads while they had to export materials which they could use at home. The progress of bitumen had been stopped, inasmuch as from 1923 to 1927 there was an increase of 55 per cent. in the use of road tar, whereas bitumen was stationary, but they desired to go further than that. They wanted British roads to be the best roads in the world. There was a great future before road tar in this connection.

Major W. J. Steele, City Engineer, Newcastle, said in reply that the use of tar as a preventive agent against dust undoubtedly saved the situation as far as dust was concerned, when the motor car first made its appearance on the roads. Without tar, he was certain, many of the roads in this country would have been unusable in the summer. At the same time they found that tar was a great preservative of the road surface.

A paper on " The Rise of Tar on Roads " was read by Mr. W. E. Cone, technical adviser, British Road Tar Association, who dealt with the question of the construction of roads, and said the selection of a surfacing material should be based on two principal factors—cost and adequacy.

Recent Developments in Oil Cracking

IN a lecture on " Recent Developments in the Art of Oil Cracking," delivered by Dr. A. E. Dunstan before the Junior Institution of Engineers on Friday, February 8, 1929, the evolution of the plant employed in producing cracked spirit was described. Cracking as applied to oil was of British and not (as commonly supposed) American origin, having been first employed in 1862 in Scotland, where a plant working at 20 lb. pressure was used to turn gas oil into kerosene. The term " cracking " was American and was suggested by the noise made by oil which had inadvertently been allowed to remain in an overheated still. Gasolene or petrol was the most important fraction of petroleum. Last year 30 per cent. was obtained by cracking crude oil and a further 20 to 30 per cent. from cracked natural gasolene The researches of the chemist, aided by improvements in plant which those researches suggested, had resulted only this year in the ability completely to break down the constituents of oils and gases and the reassembly of these components in forms which might be more profitable commercially. In answering a question as to the official prohibition of the use of cracked spirit for aviation purposes, the lecturer stated the reason it had hitherto been looked upon with disfavour was due to the possibility of its containing a gummy substance, its further refining was now possible, whereby the substance was extracted, and he considered that cracked spirit would in future be permitted for air engines.

The Nutritive Value of Iodine

THERE has been issued by the Medical Research Council a report on "Iodine in Nutrition," by Dr. J. B. Orr and Dr. Isabella Leitch, of the Rowett Research Institute, Aberdeen. The report discusses the value of iodine in the economy of the body, and deals at length with the distribution of this element in Nature. The land, rather than the sea, is the richest source of iodine.

It is pointed out that the effect of iodine on plants depends on dosage. The yield of radishes grown in a control plot to which no iodine was applied was 3,240 gms. per square metre; with an iodine dose of 0·05 gm. per square metre the yield was 5,400 gms., but with a dose of 0·5 gm. per square metre the yield fell again to 4,200 gms. In tests with peas grown in culture solution it was found that the addition of iodine to the extent of 0·0001 gm. per litre was accompanied by an increase of from 5 to 10 per cent. in the weight of the plants. The addition of 0·001 gm., however, was followed by a decrease in weight of about 30 per cent., and the toxic effect rapidly increased with increase of concentration of iodine above that level. Experiments with pigs had shown that where a small dose of iodine had been given the average gain per pig per day had been 1·55 lb., whereas pigs which had not received the iodine gained 1·37 lb. But when the dose of iodine was increased, the pigs not receiving the iodine did the better. Experiments in Switzerland had shown that boys receiving potassium iodide grew on an average 0·7 cm. more than untreated boys, and put on 0·2 kgm. more in weight. The treated girls grew on an average 0·4 cm., and put on 0·1 kgm. more than the untreated girls. It had been found that the mean weight at birth of infants of mothers using iodised salt was about 100 gms. higher than of those of not using iodised salt. The condition of the children was improved. That was definitely shown in a marked fall in the number of infants dying from "congenital weakness."

The Work of the Public Analyst

PROFESSOR W. H. ROBERTS, the Liverpool city analyst, in a lecture at the University last week stated that Liverpool had the largest and best-fitted public laboratories in the country. They had a staff second only to that of the Government laboratories in London, and dealt with over 10 000 samples annually. It was rather surprising how little the public knew of the work carried on by the department. In former days the adulteration of foods was very flagrant, such as iron filings in tea, sand in sugar, plaster in bread, etc. Nowadays those practices were almost wiped out, and they were called upon to deal more particularly with the contamination of food by means of the containers, the preservative used, or the colouring matter.

"In Liverpool," Mr. Roberts said, "the average composition of all milk sold, during the last five years, including all adulterated samples, is 3·6 per cent. fat and 8·9 per cent. other solids, a standard which is a long way ahead of the Ministry of Agriculture limit and higher than the Ministry of Health limit, and a striking result when one considers the variety of sources from which Liverpool obtains its milk supplies." The work carried out in connection with criminal investigation was also dealt with. A case was recalled in which a burglary had been committed and the only clue was that a broken window had been smeared with jam. The analysis showed the jam to be of an unusual composition—raspberry, plum, and orange—and when a pot containing the same unusual mixture was found in the home of the suspected person the case was proved.

The Nickel Merger

A STATEMENT issued with regard to the absorption of the Mond Nickel Co. into the International Nickel Co. of Canada gives details of various formalities with regard to the exchange of stock by shareholders of the former into shares of the Canadian company. Attention is also drawn to the fact that under the agreement of December 20, 1928, stock in the Canadian company issued under this agreement carries dividends in favour of shareholders in the Mond Nickel Co. who have accepted the offer for the exchange of shares.

Nitrate Trade Claim Before Anglo-German Tribunal

THE Anglo-German Tribunal, sitting in London, on Monday, February 11, heard a claim by the Salpeterwerke Gildemeiser A.-G. against Andrew Weir and Co., dealers in nitrate, London, for 5 per cent. interest on sums of £30,000, £17,000 and £9,000 which was paid following the war by the debtors to the claimants for goods supplied prior to the outbreak of hostilities. There was also a claim for the costs of the action. The Solicitor-General (Sir Boyd Merriman) and Mr. Honour (British Government Agent) appeared for the British Clearing Office; Sir Leslie Scott, K.C., M.P., and Mr. Darby for the debtors; and Dr. Huecking (German Government Agent) for the German firm.

Dr. Huecking said it was admitted by the British firm that the sums claimed were due and payment was made, but they disputed liability for interest. Considerable correspondence followed this decision, but both Clearing Offices agreed that interest was due and gave a decision to that effect. The case subsequently came before the British courts of law, when the decision reached was that under the Peace Treaty of 1919 it was not possible to enforce the joint decision of the Clearing Offices in the British Courts. Later the case was taken to the Court of Appeal and the House of Lords. Dr. Huecking quoted at length from judgments given in the appeal courts, and added that there might be differences of opinion between the British and the German Clearing Offices.

The hearing was continued on Tuesday, February 12, and on Thursday, February 14, when the court reserved judgment and adjourned.

South Metropolitan Gas Co.'s Meeting

THE general meeting of the South Metropolitan Gas Co. was held on Wednesday, February 13, in London, Dr. Charles Carpenter (president and managing director) occupying the chair. With regard to the company's proposed work on low temperature carbonisation, he said that the two systems, which they were about to work on the large scale, differed completely in their respective designs, and might be roughly said to represent the two extremes between which various modifications had been proposed. In a general way, the two might be classified by saying that the one used small coal and the other utilised fines. They would be able to test the public requirements with two different products, having the smokeless attribute in common, both being combustible in ordinary grates.

Professor H. E. Armstrong said he was naturally interested in the paragraph of the report relating to the agreement entered into with Low Temperature Carbonisation, Ltd. for the installation of a plant for the production of coalite on a large scale, as he had often at previous meetings urged the board to take notice of low temperature fuel. This announcement might well mark a new era in the policy of gas companies. It might even happen that in future all the coal burned in our towns would pass through the hands of the gas companies, who were making an experiment of the highest public importance.

F.B.I. Visit to Sweden

A PARTY of business men representing the Federation of British Industries will, under the leadership of Lord Ebbisham, arrive in Sweden on Thursday, April 25, to hold discussions with the Federation of Swedish Industries on April 26 and 27. The exact composition of the party is not yet decided upon, but it is hoped that several prominent members of the F.B.I., in addition to two representatives of the Federation's staff, will accompany Lord Ebbisham. The subjects for discussion have not yet been finally settled, but suggestions will be made at an early date on matters which the F.B.I. consider of interest, while similar suggestions which have been received from the Swedish Federation are being considered. This visit is another step in the series of international trade talks inaugurated some years ago by the F.B.I. invitation to the German Federation of Industries to visit them in London. As will be remembered, this visit was followed up by a return visit by the F.B.I. to Germany and by visits from the Italians, French, and Swedes to London and return visits of the F.B.I. to Paris and Rome.

Meeting of Borax Consolidated

Chairman on the Present Position

THE meeting of Borax Consolidated, Ltd., was held in London on Wednesday. The Earl of Leven and Melville, the chairman, who presided, said that at the last meeting he had reported that the company were developing in Southern California a new borate mineral which would be more economical for the purpose of borax production than the minerals they had hitherto worked. The existence of a very large body of that ore had been proved, and its use at the company's refineries had enabled them to show a profit for the year which they would probably not otherwise have made in face of the competition in the U.S.A. The competition arose from several sources, the most important being that of an American company operating in California, producing potash from lake brines, and also borax, which, being produced as part of the operations, had to be forced on to the market. That had led to a disastrous reduction in price. So far as potash was concerned, the European producers had so far not met competition by a reduction in price, but how long those conditions would last would presumably depend upon the development of potash production in the States and the necessity for European producers to lower their prices in consequence.

Company's Property at Searles Lake

At Searles Lake the company had a large property on the lake, with the right to work the brine free of royalty for the production of potash and by-products. The board had not so far thought it advisable to develop the property at Searles Lake for the production of potash and borax. The matter, however, was receiving most careful attention. The company's new mineral to which he had referred had great possibilities in other directions for use in various industries, especially in a concentrated form. Competition had become intensified during the current year.

An Age of Colour

THE use in colour photography of cellophane (a thin transparent celluloid material), when impregnated with certain chemicals which confer upon it a sensitivity to light, was demonstrated by Mr. D. A. Oliver, of Colour Photographs, Ltd. to members of the Printing Crafts Guild at the College of Technology, Manchester, last week. The process, the speaker considered, was bound to affect the printing trade. Anything which stimulated the use of colour, he said, was all for the good, because we were coming to an age of colour. More three-colour printing was being done. Colour kinematography was an accomplished fact and would unquestionably be used in future, and the tremendous educative force of the kinema would inevitably influence the general trend. Colour photography in advertising was being increasingly used as opposed to artists' work, and there were indications of the extensive use of the process for the production of all sorts of illustrations where realism was needed rather than imagination. An attractive array of colour-photographs gave point to the lecturer's words.

Borax Competition in the United States

THE competition as regards borax and boron compounds in the United States between the Pacific Coast Borax Co. and the American Potash and Chemical Co. still persists. The main source of material of the Pacific Coast Borax Co. is a newly-discovered substance, Rasorite (sodium borate hydrate), which occurs in large quantities in Southern California. It is stated that when plant now under construction is completed, the latter source will be sufficient to cover the needs of the whole world. The American Potash and Chemical Co. obtains its borax from Searles Lake, Trona, California, by a method worked out by Dr. J. E. Teeple. According to the United States Department of Commerce, last year's export of borax, etc., from the United States amounted to 60 per cent. more than in 1927; during the first 10 months of 1928, the value of the exports was 3,227,000 dollars, which, in spite of the lower average price, is 33 per cent. more than the value of the whole of the 1927 exports.

U.S. Conference on Fertiliser Trade Practices

PROPOSALS for the abandonment of certain trade practices which were regarded as resulting in unfair competition were discussed at a conference of the United States fertiliser industry called by the Federal Trade Commission on Tuesday, January 29, in Washington. The purpose of the conference was the elimination of these practices, and the subjects discussed included:—The sale of goods at supposedly fixed prices, but with undisclosed collateral conditions that provide for subsequent reductions or allowances in event of later sales of like goods at lower prices; practice under which buyers have received and used goods shipped on open bills of lading and then refused to settle on any terms except those satisfactory to themselves, which were often quite different from the terms of the sales contract; provision of truck service without adequate charge of reimbursing the dealer or purchaser for trucking costs, frequently used as a method of rebating or price discrimination; pursuit of sales methods that in their nature promote unfair competition through temptation to secret rebates and concessions, such as split commissions by salesmen and devices producing similar results.

Removal of Sulphur Compounds from Gases

THE newer catalytic processes such as the synthesis of ammonia, synthesis of metanol from water gas, and synthesis of petroleum from water gas require the complete removal of sulphur compounds from the gases used. Even traces of organic sulphur compounds, which would be entirely unimportant when the gas is used as a fuel, are sufficient to destroy the catalysts used in these processes. Hydrogen sulphide may be satisfactorily removed on an industrial scale by well-known methods. The only satisfactory process for removal of organic sulphur to the required extent, which has been used on an industrial scale in the United States at least, involves liquefaction of the gas at low temperatures. It is desirable, however to have a cheaper method. Consequently, the Pittsburgh Experiment Station of the United States Bureau of Mines is starting an investigation of this problem. It has been claimed by Dr. Franz Fischer, of Germany, that organic sulphur compounds may be completely converted to hydrogen sulphide at relatively low temperatures when the gas is passed over appropriate catalysts at relatively low temperatures and in the presence of hydrogen. Details of the process have been withheld, however. Evidently the process needs confirmation and presentation of results of detailed study.

Survey of the Scottish Coalfield

IN anticipation of the completion within the next few months at Glenboig (Glasgow) of a large plant devoted to the scientific treatment of coal by low temperature distillation, the Bussey Coal Distillation Co. has inaugurated an exhaustive analysis of coals taken from every coalfield in Scotland with a view to selecting the most suitable type for giving a high yield of oil, gas, and smokeless fuel. The whole of the Scottish coalfield has been surveyed, and chemists are now subjecting to standard tests over 200 widely differing varieties of coal from the "black" district extending from Edinburgh to Glasgow.

Appointments Vacant

CHEMIST, with experience of physiological problems, to assist in carrying out a survey of the River Tees Estuary.—E. J. Allen, Director, The Marine Biological Laboratory, Plymouth, Devon. February 28.

ASSISTANT IN PATHOLOGICAL CHEMISTRY in the University of Cape Town.—The Secretary, Office of the High Commissioner for the Union of South Africa, South Africa House, Trafalgar Square, London, W.C.2. February 26.

CHEMIST, Main Drainage Department, Public Works Ministry, Cairo, Egypt.—Applications to the Director General at the above address. May 1. Copies of contract from the Royal Egyptian Legation, 75, South Audley Street, London, W.1.

From Week to Week

FATAL INDUSTRIAL ACCIDENTS reported during January included two in chemical factories.

MR. F. J. DENT, B.Sc., has been appointed gas research chemist in the Department of Coal Gas and Fuel Industries of the University of Leeds.

MAJOR GUY BOLSOVER, manager of the Cockerton Chemical Works, Darlington, had his right hand severely crushed in a machine at the works on Tuesday.

MR. W. VINCENT WAITE, formerly chief engineer and general works manager of Robert Heath and Low Moor Iron Co., Ltd., has been appointed general manager of Sensible Heat Distillation, Ltd. ("L and N" patented process).

PERCENTAGE UNEMPLOYMENT in the chemical industry in Great Britain at January 21 was 6.9; in explosives manufacture, 5.2; in paint varnish, japan, red and white lead manufacture, 5.3; and in oil, grease, glue, soap, ink, match, etc. manufacture, 6.5.

LORD MELCHETT is suffering from an attack of tonsilitis and has had to postpone his return to England from the South of France. Lady Melchett is slowly recovering from a severe attack of influenza and will not be able to return to London for several weeks.

AN OUTBREAK OF FIRE was caused by acid boiling over on Tuesday, at the premises of Boake, Roberts and Co., Ltd., Stratford, London. One floor, covering an area of about 60 ft. by 30 ft., used as a store, had about two-thirds of the contents damaged, whilst a part of the roof was destroyed.

THE REPORT of the Executive Committee of the British Sugar Beet Society for the year 1928-29 discloses a drop of some 47,000 acres in the area sown to sugar beet in 1928, but the yield per acre is shown to be much larger. The average sugar content is 17·3 per cent., slightly more than that of 1927.

A NEW LUSTRELESS ARTIFICIAL SILK product, under the name of "Glamat" has been placed on the market by the Vereinigte Glanzstoff Fabriken A.G. The material is described as a new sort of viscose artificial silk possessing many attributes of acetate artificial silk and especially the invariable dull tone of natural silk.

UNEMPLOYED INSURED PERSONS at January 21 in the chemical manufacturing industry in Great Britain numbered 6,892 (males 6,060, females 832); in the explosives industry, 1,043 (males 648, females 395); in paint, varnish, japan, red and white lead manufacture, 991 (males 844, females 147); in oil, grease, glue, soap, ink, match, etc. manufacture, 4,944 (males 4,071, females 873).

THE BELGIAN CONSUMPTION of Chilean nitrate during 1928 was 129,855 tons, nearly double the 1927 figure. A large cyanamide plant in Ghent will commence operations in April, marking the first production of this article in Belgium. The enterprise is fostered by the Société Anonyme d'Ougrée-Marihaye and the Société General de Belgique bank, with the Boerenbond Belge, a co-operative organisation, contracting for the output.

LOW TEMPERATURE TAR may, according to German reports, be converted in 90 per cent. yield to benzol by hydrogenation, a process for the purpose involving the use of a cheap catalyst with pressure having been worked out in Budapesth. Further reports indicate that a syndicate has taken out an option on a Swiss process whereby it is claimed that tar may be converted in 50 per cent. yield at ordinary pressure and low temperature, the process being also applicable to coal.

MR. JOHN C. JENNINGS, of London, chief chemist of the research and physical laboratories of W. B. Dick and Co., Ltd., in an address last week to the South Wales section of the Society of Chemical Industry, on "The Development of Modern Methods of Testing Lubricating Oils," dealt exhaustively with viscosity, pour-point, and coke tests, and with tests for oxidation and stability. He also discussed the advance in modern testing methods, the results obtained, and the effects of various methods.

AS A RESULT of the development of the Synthetic Ammonia and Nitrates Works near Haverton Hill, the L.N.E.R. announce that considerable improvements are about to be made at Port Clarence Station, the terminus of the Billingham and Port Clarence branch, on the north side of the river Tees, which have become necessary on account of the increase in the number of passengers now using the station. To avoid inconvenience to men employed at the works the times of the Middlesbrough Transporter Bridge are to be altered to coincide with train times at Port Clarence.

MR. N. S. GRIEVE, of the staff of Nitram, Ltd., addressing a meeting of the Liverpool and District Farmers' Club last week, said that since 1913 the use of fertilisers had increased in Denmark 308 per cent., Italy 108, France 97, and Germany 80, while Great Britain showed only 9½. If the system was not economical foreign countries would not have shown such advances. He did not suggest that the use of artificial fertilisers alone would prove the salvation of the farmer, but it was one of the factors that would help him considerably. If a farmer could economically increase his crop, it was equivalent to an increase in the price of the produce.

THE DEUTSCHE CHEMISCHE GESELLSCHAFT (German Chemical Society) has taken over the care of the tomb of vant Hoff.

THE MARRIAGE will take place in June of Dr. S. Glasstone, lecturer in physical chemistry in the University of Sheffield, and Miss V. Collingwood.

THE SWANSEA VALLEY TAR MACADAM CO. intend, we understand, to install new machinery at their works at Ystradgynlais with a view to increasing output to 1,000 tons a week.

THE FROST which persists on the Continent has, states the *Chemiker-Zeitung*, begun to affect shipping very severely, and is influencing the German export trade very unfavourably, business being very small in consequence.

DISEASES OF OCCUPATIONS reported in Great Britain and Northern Ireland during January under the Factory and Workshop Act included one case of aniline poisoning and three cases of chrome ulceration (including one in the dyeing and finishing trade).

THE OBJECT, it is reported, of the Compagnie Neerland Aise de l'Azote, which was recently formed in Brussels with a capital of 157,500,000 Belgian francs and with the co-operation of the Montecatini Co., is to manufacture synthetic phosphate at Sluiskil, in the province of Zeeland.

THE I.G. FARBENINDUSTRIE A.-G. held an extraordinary general meeting at Frankfurt-on-Main on Wednesday, at which the agreement with the Internationale Gesellschaft für Chemische Unternehmungen of Basle (details of which have already appeared in this journal) was approved.

THE NON-INFLAMMABLE FILM CO., LTD., announce that their chairman, Sir Herbert Blain, has resigned from the board and that Sir William Veno and Mr. Morris Greenhill have been elected directors of the company. Sir William Veno is chairman and governing director of Veno Trust, Ltd., and a director of the Cellulose Acetate Silk Co.

CAPTAIN F. A. FREETH, F.R.S., in his capacity as Honorary Lecturer on the Theory and Practice of Heterogeneous Equilibria at University College, Gower Street, London, will deliver a public inaugural lecture on "The Four-Component System in Peace and War," at the College on Friday, March 1, at 5.15 p.m. The lecture is open to all interested, free and without ticket.

A MEMORANDUM on the market for lubricating oils and greases in Argentina has been prepared by the Department of Overseas Trade from information furnished by the Commercial Counsellor at Buenos Aires. United Kingdom firms desirous of receiving a copy of this memorandum should communicate with the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. Reference number B.X. 5115 should be quoted.

A NEW JOURNAL entitled *Aircraft Engineering*, devoted to the science and practice of aeronautics, has just been published (monthly, two shillings). The first number (for March) contains a number of interesting articles by authorities on their various subjects. The editor of the journal is Lt.-Col. W. Lockwood Marsh, and the publishers are the Aircraft Engineering Co. The address of the editorial offices is Sentinel House, Southampton Row, London, W.C.1.

THE GOVERNOR-GENERAL OF CANADA (Lord Willingdon) at Montreal last week, opened a new pulp and paper institute, an organisation for research in cellulose chemistry, utilisation of forest products, and advancement of the paper industry, which is to be operated under the joint auspices of the Pulp and Paper Association, the McGill University and the Dominion Government. A miniature pulp and paper mill has been installed in the new building for experimental purposes.

PROFESSOR JOHN J. ABEL and Dr. H. Jensen, at the meeting of the American Association for the Advancement of Science, claimed to have isolated the hormone controlling sugar in the animal organism. Professor Abel said that this was the first occasion on which a powerful specific hormone in the form of a crystalline protein of comparatively simple composition had been isolated. It forms the active component of insulin, which is at present obtained by extraction from animal glands. Through the isolation of this substance the synthesis of insulin is envisaged.

THE SCOTTISH ADVISORY COMMITTEE on River Pollution Prevention, under the chairmanship of Sir John R. Findlay, met on Friday, February 15, in the conference room of the Department of Health for Scotland, Edinburgh, and completed their investigations into the conditions of the river Tweed, evidence being received from representatives of the burgh of Kelso and the West District of the county of Berwick. The Committee will shortly report to the Department of Health for Scotland the result of these investigations. Investigations into conditions of the river Esk (Midlothian) were commenced.

Obituary

DR. FRANZ OPPENHEIM, at Cairo, on February 13, aged 76. He was the founder in 1880 of the Agfa concern, and when this was absorbed by the I.G. Farbenindustrie (of which it is now the photographic side) he became a director of the latter. His only son, Dr. Kurt Oppenheim, also a director of the I.G., was the victim of a motoring accident a few days ago.

References to Current Literature

British

FATS.—The fatty acids and component glycerides of some New Zealand butters. T. P. Hilditch and Eveline E. Jones. *Analyst*, February, pp. 75–96.

HYDROGENATION.—The products of partial hydrogenation of higher monoethylenic esters. T. P. Hilditch and N. L. Vidyarthi. *Proc. Roy. Soc. A*, February 4, pp. 552–563.

The products of partial hydrogenation of some higher polyethylenic esters. T. P. Hilditch and N. L. Vidyarthi. *Proc. Roy. Soc. A*, February 4, pp. 563–570.

LOW-TEMPERATURE TAR.—A chemical study of low-temperature tar. G. T. Morgan, D. D. Pratt, and J. Ross. *J.S.C.I.*, February 8, pp. 29–34 T.

THYROXINE.—Resolution of *dl*-thyroxine. C. R. Harington. *Biochem. J.*, Vol. XXII, No. 6, pp. 1427–1435. Thyroxine has now been resolved into its optically active stereoisomers. Biological tests indicate that *l*-thyroxine is definitely more active physiologically than the *d*-form, but that the latter possesses considerable biological activity.

Some derivatives of thyroxine. J. N. Ashley and C. R. Harington. *Biochem. J.*, Vol. XXII, No. 6, pp. 1436–1445. Glycyl-*dl*-alanyl- and *N*-lactyl-thyroxine have been prepared.

United States

CATALYTIC SYNTHESIS.—Catalysts for the formation of alcohols from carbon monoxide and hydrogen.. III.—X-ray examination of methanol catalysts composed of copper and zinc. P. K. Frolich, R. L. Davidson, and M. R. Fenske. *Ind. and Eng. Chem.*, February 1, pp. 109–111. The results point to a definite relation between the specific catalytic effect and the distance between the atoms of the two components. Zinc oxide is partly reduced in the presence of copper oxide.

CELLULOSE.—What the X-ray tells us of the structure of cellulose. E. A. Hauser. *Ind. and Eng. Chem.*, February 1, pp. 124–125. Based on recent publications of Meyer and Mark, Trillat on cellulose, and analogous work on rubber and other elastic colloids undertaken by the author.

GENERAL.—Vapour pressures in the systems diethyl phthalate with ethyl alcohol and with methyl alcohol. H. W. Foote and J. K. Dixon. *Amer. Journal of Science*, February, pp. 146–152. The two systems furnish data for obtaining partial pressures of pure alcohol vapour at 25° C.

An asphaltite from the Philippine Islands. E. T. Hodge. *Philippine Journal of Science*, November, 1928, pp 263–272.

LOW-TEMPERATURE CARBONISATION.—Low-temperature carbonisation of coal. S. W. Parr. *Ind. and Eng. Chem.*, February 1, pp. 164–168.

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RAYON.—Identification of rayon. W. D. Grier. *Ind. and Eng. Chem.*, February 1, pp. 168–171.

WATER.—Sodium aluminate as a coagulant in chemical treatment of cannery waste waters. J. A. Holmes and G. J. Fink. *Ind. and Eng. Chem.*, February 1, pp. 150–151. Improved results have been obtained at two tomato canneries by the use of small doses of sodium aluminate as a coagulant along with lime. The average chemical treatment at the plant described, during 1927, was 2·5 pounds of lime and 0·4 pound of sodium aluminate per 1,000 gallons of waste water.

Factors contributing to quality of public water supplies. H. E. Jordan. *Ind. and Eng. Chem.*, February 1, pp. 152–156.

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German

ANALYSIS.—Advances in electroanalysis. A. Schleicher. *Zeitschrift angewandte Chem.*, February 9, pp. 146–148.

Critical studies of gas-analytical methods of determination of nitrous oxide. H. Menzel and W. Kretschmar. *Zeitschrift angewandte Chem.*, February 9, pp. 148–156.

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GENERAL.—More chemists in industry and commerce. New domains of activity for chemists. IV.—The propaganda-chemist. K. Haupt. *Chemische Fabrik*, February 13, pp. 73–74.

The instability of morphine in aqueous solution, especially on sterilisation. R. Dietzel and W. Huss. *Archiv Pharmazie*, December, pp. 641–667.

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TOBACCO.—The nitrate content of tobacco, and a source of error in the methods of determination used hitherto. T. Andreadis. *Biochem. Zeitschrift*, Vol. 204, Parts 4–6 pp. 484–492.

Miscellaneous

ADSORPTION.—Investigations on the adsorption of gases and vapours by various types of silica gel. E. Bosshard and E. Jaag. *Helvetica Chimica Acta*, Vol. 12, Part 1, pp. 105–113 (in German).

ANALYSIS.—Experiments on the quantitative determination of higher unsaturated fatty acids. H. H. Escher. *Helvetica Chimica Acta*, Vol. 12, Part 1, pp. 27–49 (in German).

CELLULOSE.—The selective action of the three hydroxyl groups of cellulose. T. Nakashima and I. Sakurada. *J. Soc. Chem. Ind. Japan* (supplemental binding), January, pp. 9–10 B (in German).

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FATTY ACIDS.—Remarks on the distillation of higher unsaturated fatty acids. H. H. Escher. *Helvetica Chimica Acta*, Vol. 12, Part 1, pp. 99–102 (in German).

The conversion of higher fatty acids into their barium salts. H. H. Escher. *Helvetica Chimica Acta*, Vol. 12, Part 1, pp. 103–105 (in German).

OILS.—Two new methods for the determination of the oil in olives. S. Kaloyereas, W. G. Cruess, and B. E. Lesley. *Bulletin Matières Grasses*, 1928, Parts 11–12, pp. 305–310 (in French).

The mechanical treatment of the fruit of the oil palm. L. Letecheur. *Bulletin Matières Grasses*, 1928, Parts 11–12, pp. 311–314 (in French).

ORGANIC.—The action of methyl *p*-toluenesulphonate on α-naphthylamine. W. M. Rodionow and W. E. Vvedenskij. *Bulletin Soc. Chim. France*, January, pp. 121–124 (in French). The method may be used for the preparation of mono- and di-methyl-α-naphthylamine.

Derivatives of 2-methylanthraquinone and of anthraflavone. P. Ruggli and E. Merz. *Helvetica Chimica Acta*, Vol. 12, Part 1, pp. 71–99 (in German).

The ozonisation of unsaturated gaseous hydrocarbons. I.—Ozonisation of ethylene. II.—Ozonisation of propylene and of a cracked gas. E. Briner and P. Schnorf. *Helvetica Chimica Acta*, Vol. 12, Part 1, pp. 154–181, 181–186 (in French).

STEROLS.—Cholesterol and its relationships to the terpenes. E. Montignie. *Bulletin Soc. Chim. France*, January, pp. 97–100 (in French).

A specific colour reaction for ergosterol and its transformation products. E. P. Haussler and E. Brauchli. *Helvetica Chimica Acta*, Vol. 12, Part 1, pp. 187–193 (in German).

VULCANANISATION.—Notes on cold vulcanisation (Parkes process). P. Bourgois. *Bulletin Federation Industries Chim Belgique*, January, pp. 3–8 (in French).

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Complete Specifications

304,000. HYDROGENATING OPEN CHAINS CONTAINING NITROGEN IN UNSATURATED UNION, PROCESS FOR. O. Y. Imray, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, December 20, 1927.

It has been found that open chains which contain nitrogen in unsaturated union such as $R-C\equiv N$, $R\text{-}C(R^1)=N-R''$, $R\text{-}N=N-R^1$, $R\text{-}N\equiv N$, $R-N=O$ (R^1) *e.g.*, hydrocyanic acid, cyanic acid, isocyanic acid, salts or esters of these acids, nitriles, nitroso-compounds, imino-esters, aldehyde-imines, amidines, diazonium compounds, diazotates, can be hydrogenated in the presence of a catalyst such as nickel, if the operation is conducted in liquid phase in the presence of an electrolyte which yields at least so many acid ions as correspond with the base produced. Examples are given of the hydrogenation of potassium cyanide, aceto-nitrile, benzyl-cyanide, and azo-benzene.

304,052. COPPER SULPHATE, MANUFACTURE OF. Hungária Mütrágya, Kénsav és vegyi ipar részvénytarsasag, Arpáad utca 8, Budapest, V, Hungary, and L. Deutsch, 5, Kén utca, Budapest, IX, Hungary. Application date, February 10, 1928.

The object is to avoid the long period necessary for the crystalisation of commercial copper sulphate in large crystals. A concentrated solution of copper sulphate is crystallised while cooling in a vat provided with stirring mechanism so that small crystals of 0·25-5 mm. are obtained. The crystals are separated and while still wet are pressed into briquettes and dried. These briquettes can be transported without pulverisation.

304,263. BENZANTHRAQUINONE DERIVATIVES AND SUBSTITUTION PRODUCTS, MANUFACTURE OF. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, October 18, 1927.

The process is for the manufacture of 1 : 2-benzanthraquinone-peridicarboxylic acid, its substitution products, and derivatives. The latter terms covers the condensation products obtained from the imides and imidazoles obtainable from naphthalic-anhydride-and-4-benzoyl-*o*-carboxylic acid by the action of ammonia, primary aliphatic or aromatic monamines or aromatic *o*-diamines. These products are obtained by subjecting a corresponding naphthalic-acid-4-benzoyl-ortho-carboxylic acid to the action of an acid condensing agent, such as sulphuric acid or aluminium chloride, with or without boric acid. The products are starting materials for the manufacture of dyestuffs, and examples are given.

304,350. OXIDATION OF VOLATILE ORGANIC COMPOUNDS. Imperial Chemical Industries, Ltd., Broadway Buildings, Westminster, London, S.W.1, S. W. Rowell and H. S. Hirst, Norton Hall, The Green, Norton-on-Tees, Durham. Application dates, October 18, 1927, January 2, and July 12, 1928.

Acetic acid is obtained by the oxidation of acetaldehyde by air or oxygen. The reaction is conducted in an acetic acid medium containing a catalyst, such as manganese acetate 0.2 per cent. with cobalt acetate 0.002 per cent. The acid flows through a tower in counter-current to the acetaldehyde and air, and is continuously withdrawn at the bottom and an amount of pure acid separated corresponding to the amount of acetaldehyde converted. The acid may be separated or purified by distillation or freezing, and the solution of catalyst in acetic acid is thus maintained at its original concentration, and used again.

304,403. HYDROGENATION OF NAPHTHALENE. Technical Research Works, Ltd., and E. J. Lush, 4, Milner Street, London, S.W.3. Application date, November 4, 1927.

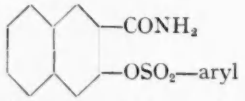
The hydrogenation of naphthalene to tetrahydronaphthalene by means of a nickel catalyst is conducted at sufficiently high temperature to avoid condensation of the naphthalene on the catalyst. It has been found that if condensation occurs some decahydronaphthalene and other products are also contained.

304,421. LOW BOILING OILS AND CYANIDES, MANUFACTURE OF. J. C. Clancy, 839, Dunlewey Street, Asbury Park, N.J., U.S.A. Application date, November 21, 1927.

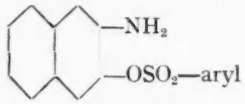
High-boiling hydrocarbon oils are distilled in contact with an alkali metal cyanide. A large proportion of desulphurised lower-boiling oil is obtained, and the sulphur compounds are converted into sulpho-cyanide. Oil vapour or gases and ammonia may also be passed through the cyanide so that the ammonia reacts with any sodium formate formed by the action of water on the cyanide, to regenerate the cyanide. The residue consisting of coke, alkali metal cyanide, and its decomposition products is treated with sodium carbonate and nitrogen to form additional cyanide by utilisation of some of the carbon. The cyanide decomposed in the distilling process is thus reconstituted and additional cyanide formed which can be readily separated from the carbon residue. This method is more economical than recovery of the cyanide from the coke by leaching.

304,439. 2 : 3-AMINO-NAPHTHOL DERIVATIVES, MANUFACTURE OF. O. Y. Imray, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, December 15, 1927.

These products are obtained from an O-aryl-sulphonic ester of 2 : 3-hydroxy-naphthalene-carboxy amide of the formula :



or a nuclear substitution product, which are subjected to the action of an alkali metal salt of hypochlorous or hypobromous acid according to Hofmann's reaction. An O-aryl-sulphonyl-2 : 3-amino-naphthol of the formula :



or a nuclear substitution product, is thus obtained, and is treated with a saponifying agent to eliminate the aryl-sulphonic residue and obtain 2 : 3-amino-naphthol and nuclear substitution derivatives. Examples are given.

304,441. NAPHTHOL ETHER CARBOXYAMIDES AND AMINO-NAPHTHOL ETHERS, MANUFACTURE OF. O. Y. Imray, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, December 19, 1927.

Oxy-naphthalene-carboxy-amides are treated with alkylating agents to obtain napththol-ether-carboxy-amides, which are then converted into the corresponding amino-naphthol-ethers by the action of alkali hypochlorite or hypobromite according to Hofmann's reaction. Examples are given of the preparation of 2 : 3-methoxy-naphthoylamide and 2 : amino-3-naphthol-methyl-ether ; 1-ethoxy-2-naphthoyl-amide and 2-amino-1-naphthol-ethyl-ether ; and other similar products.

304,498. FINELY DIVIDED SULPHUR, PRODUCTION OF. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges. Frankfort-on-Main, Germany. Application date, February 20, 1928. Addition to 177,103.

Specification No. 177,103 (see THE CHEMICAL AGE, vol. vi, p. 525) describes the preparation of highly dispersed or colloidal sulphur by concentrating solutions of ammonium polysulphides in the presence of a protective colloid. In this invention, the solution is caused to flow along the inner wall of an inclined or vertical pipe which is continuously rotated. Steam is passed into the pipe in the same or opposite

direction, and the polysulphide solution is concentrated and colloidal sulphur is precipitated.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention:—277,371 (I.G. Farbenindustrie Akt.-Ges.), relating to pigment dyes, see vol. xvii, p. 467; 279,128 (H. Bomke), relating to hydrogen, see vol. xvii, p. 578; 279,489 (I.G. Farbenindustrie Akt.-Ges.), relating to vat dyestuffs, see vol. xvii, p. 623; 280, 553 (W. Traube and E. Hellriegel), relating to N-monoalkyl derivates of the aminophenols, see vol. xviii, p. 57; 280,924 (Schering Kahlbaum Akt.-Ges.), relating to thymol and hydrogenation products, see vol. xviii, p. 85; 282,634 (F. Fischer), relating to purification of gases from organically combined sulphur, see vol. xviii, p. 204; 283,163 (I.G. Farbenindustrie Akt.-Ges.), relating to organic bases, see vol. xviii, p. 225; 283, 177 (A. Uhlmann), relating to production of hydrocarbons, see vol. xviii, p. 225; 284,685 (Soc. Chimique des Usines du Rhône), relating to protection of copper apparatus from corrosion, see vol. xviii, p. 327; 291,419 (Selden Co.), relating to catalytic oxidation of organic compounds, see vol. xix, p. 126.

International Specifications not yet Accepted

302,271. PRESERVING INDIARUBBER. Goodyear Tire and Rubber Co., 1144, East Market Street, Akron, Ohio, U.S.A. (Assignees of A. M. Clifford, 649, Honodle Avenue, Akron, Ohio, U.S.A.). International Convention date, December 13, 1927.

ββ-Dinaphthylamine, αβ-dinaphthylamine, and αα-naphthylamine are employed to improve the ageing qualities of rubber.

302,306. NITROGEN AND HYDROGEN. Soc. d'Etudes Minières et Industrielles, 1 bis, Rue du Havre, Paris. International Convention date, December 14, 1927.

Nitrogen-hydrogen mixtures are freed from carbon monoxide acetylene and other hydrocarbons, sulphur and phosphorus compounds, by passing at 600° C. over wood charcoal. A small quantity of water vapour must be present.

302,321. TRICHLORETHYLENE. Consortium für Elektrochemische Industrie Ges., 20 Zielstattstrasse, Munich, Germany. International Convention date, December 14, 1927.

Acetylene tetrachloride vapour is passed at 500° C. at high speed over pumice stone, wood charcoal, active carbon or silica gel, with metallic oxides and salts as catalysts. Trichlorethylene is separated by fractional condensation.

302,599, 302,600-1. DYES. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, December 17, 1927.

302,599. Diazotised dihalogen-2-aminotoluenes having one halogen in *p*-position to the CH_3 group and having at least one halogen other than chlorine, are coupled with arylides of 2 : 3-oxynaphthoic acid. The resulting dyes are insoluble in water and of good fastnesss to light. Examples are given.

302,600. Diazotised 3 : 5-dihalogen-2-aminotoluenes are coupled with arylides of 2 : 3-oxynaphthoic acid. Examples are given.

302,601. Diazotised 3 : 6- or 5 : 6-dihalogen-2-aminotoluenes are coupled with arylides of 2 : 3-oxynaphthoic acid. Examples are given.

302,659. TITANIUM PIGMENTS. Soc. de Produits Chimiques des Terres Rares, 129, Avenue des Champs Elysées, Paris. (Assignees of Verein für Chemische und Metallurgische Produktion, General-direktion; Carlsbad, Czechoslovakia.) International Convention date, December 19, 1927.

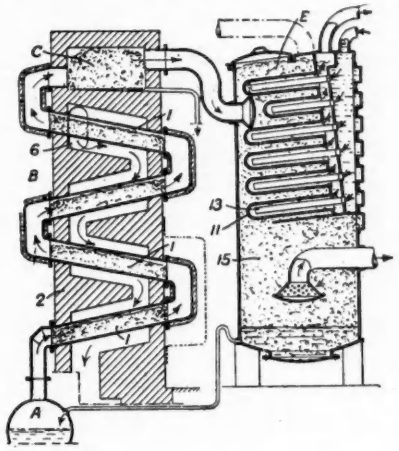
Titanium pigments consist of titanium dioxide with 10-30 per cent. of precipitated barium carbonate.

302,733. SYNTHETIC RUBBER. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, December 21, 1927.

Synthetic rubber is obtained by mixing together various polymerisation products obtained by polymerising isoprene under different conditions and for different times.

302,899. DEPOLYMERISING HYDROCARBONS. J. Mercier, 15, Rue d'Astorg, Paris. International Convention date, December 22, 1927.

Vapour from a boiler A passes through rectangular retorts I containing metallic scale or other catalyst, which are built



302,899

into a furnace 2 and heated by hot gases passing in counter current through a flue 6. The catalyst C is not heated. The vapour then passes into a chamber 15 containing catalyst and having water cooling tubes 11, 13 in its upper part. The vapour then passes into a condenser.

302,912. CATALYTIC HYDROGENATION. Ges. für Teerverwertung, Meiderich, and H. Kaffer, 69, Emericherstrasse, Meiderich, Duisburg, Germany. International Convention date, December 23, 1927.

Naphthalene and benzene are hydrogenated using as catalyst the residue from the hydrogenation of coal by the Bergius process.

302,924. ZINC SALT SOLUTIONS. Metallges. Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, December 23, 1927.

Zinc-oxide-containing materials are treated with acid in such a manner that any local excess of acid is avoided and solution of impurities is thus prevented. The acid may be added gradually.

302,927. HALIDES. Naamlooze Vennootschap Electrochemische Industrie, 20, Molenweg, Roermond, Holland. International Convention date, December 22, 1927.

Mixtures of oxygenated inorganic compounds with carbon or other reducing agents are treated with free halogens at 200-1000° C. A mixture of calcium phosphate and carbon may be treated with chlorine at 600° C. to obtain phosphorus pentachloride and calcium chloride. Mixtures of barytes and carbon, or bauxite and carbon may be similarly treated.

302,928. DYES. I.G. Farbenindustries Akt.-Ges, Frankfort-on-Main, Germany. International Convention date, December 23, 1927. Addition to 282,409. (See THE CHEMICAL AGE, Vol. XVIII, p. 183.)

A 4-halogen-1-aminoanthraquinone-2-sulphonic acid is treated with a monoacyl compound of the *m*-phenylenediamine series containing an alkyl, or hydroaromatic residue in the acylamino group. Acid wool dyes are obtained.

302,939. ORGANIC BASES. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, December 23, 1927. Addition to 283,163 and 296,423. (See THE CHEMICAL AGE, Vol. XVIII, p. 225, and Vol. XIX, p. 441.)

Specifications 283,163 and 296,423 describe the production of organic bases by catalytic treatment of mixtures of acetylene with ammonia or organic bases. In this invention, the products are washed with the condensation products of the reaction, or fractions from them. Fractions boiling above 100° C. are first used to cover the bases, and fractions boiling

below 120° C. are then used to recover acetylene and ammonia. The washing is effected below 0° C.

302,940. SYNTHETIC DRUGS. Soc. des Usines Chimiques Rhône-Poulenc, 21, Rue Jean-Goujon, Paris. (Assignees of E. Fourneau, 21, Rue Jean-Goujon, Paris.) International Convention date, December 23, 1927.

Bromopropiophenone is obtained by direct bromination of propiophenone, and is then treated with methylamine in benzene or alcohol solution to obtain α-methylaminoethylphenylketone. This is hydrogenated using finely divided platinum as a catalyst to obtain phenyl-methyl-aminopropanol (synthetic ephedrine).

LATEST NOTIFICATIONS.

305,645. Process for the preparation of sodium sulphide or similar chemical substances in the form of bodies of predetermined shape and size. Kali-Chemie Akt.-Ges. February 10, 1928.

305,648. O-oxynitrose dyes and their metal lacquers. Geigy Soc. Anon., J. R. February 9, 1928.

305,536. Method for the purification of benzanthrone. Newport Co. February 6, 1928.

305,661. Manufacture of esters of polymerized carbohydrates. I.G. Farbenindustrie Akt.-Ges. February 10, 1928.

305,578. Process for the production of anhydrous aluminium chloride. I.G. Farbenindustrie Akt.-Ges. February 7, 1928.

305,588. Process for the manufacture of alkaline earth and alkali formates and chromium green. I.G. Farbenindustrie Akt.-Ges. February 7, 1928.

305,589. Process for the manufacture of phenoxy quinoline carboxlyic acids and esters thereof. I.G. Farbenindustrie Akt.-Ges. February 7, 1928.

305,592. Manufacture of vat-dyestuffs of the indigo series. I.G. Farbenindustrie Akt.-Ges. February 7, 1928.

305,593. Manufacture of ortho-(aminoaroyl)-benzoic acids and inner anhydrides thereof. I.G. Farbenindustries Akt.-Ges. February 7, 1928.

305,594. Process of separating formic acid from acetic acid. I.G. Farbenindustrie Akt.-Ges. February 7, 1928.

305,597. Process for the manufacture of water-soluble products from commercial fatty acids obtained from raw wool fat. I.G. Farbenindustrie Akt.-Gesand Carpmael. February 7, 1928.

305,674. Process for the manufacture of readily-soluble acyl celluloses yielding clear solutions. I.G. Farbenindustrie Akt.-Ges. February 9, 1928.

305,679. Manufacture of vat dyestuffs of the benzanthrone series. I.G. Farbenindustrie Akt.-Ges. February 10, 1928.

305,931. Process for the manufacture of useful products from waste alkali lye liquors. I.G. Farbenindustrie Akt.-Ges. February 11, 1928.

305,943. Preserving and disinfecting media. I.G. Farbenindustrie Akt.-Ges. February 9, 1928.

305,946. Manufacture of cellulose ethers. I.G. Farbenindustrie Akt.Ges. February 10, 1928.

305,947. Manufacture of soluble cellulose esters. I.G. Farbenindustrie Akt.-Ges. February 11, 1928.

Specifications Accepted with Date of Application

280,886. Vat dyestuffs, Production of. I.G. Farbenindustrie Akt.-Ges. November 18, 1926.

282,427. Metal mercapto carboxylic acid esters, Manufacture of. Schering Kahlbaum Akt.-Ges. December 16, 1926.

291,004. Decomposing ores of zirconium and other rare earth metals, and of titanium. Deutsche Gasglühlicht Auer-Ges. May 23, 1927.

305,082. Vat dyestuffs of the anthraquinone series, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) October 26, 1927.

305,108. Hydrocarbon oil, Process and apparatus for treating. C. Arnold. (*Imperial Oil, Ltd.*) August 30, 1927.

305,147. Aliphatic acid anhydrides, Manufacture of. H. Dreyfus. July 30, 1927.

305,263. Distilling or cracking oils and like carbonaceous liquids. A. L. Rispler. November 3, 1927.

305,308. Esters, Manufacture of. C. Arnold. (*Standard Oil Development Co.*) November 21, 1927.

305,311. Aluminium-silicon alloys, Production of. A. Phillips, E. Baron and Metropolitan-Vickers Electrical Co., Ltd. November 24, 1927.

304,639. Recovery of the tin contained in the residues of tin plate manufacture, Process for. Les Petits Fils de F. de Wendel et Cie. January 23, 1928.

300,177. Urethanes of secondary alcohols, Manufacture of. I.G. Farbenindustrie Akt.-Ges. November 7, 1927.

Applications for Patents

Alilaire, E. Manufacture of concentrated diastasic extracts, etc. 4,672. February 12. (France, March 3, 1928.)

Bensa, F. Manufacture of perylene tetra-carbonic acid. 4,511. February 11. (Austria, April 6, 1928.)

Braham, J. E., Hughes, G. E., Waring, A. H., and Imperial Chemical Industries, Ltd. Distillation of water. 4,919. February 14.

Brightman, R., and Imperial Chemical Industries, Ltd. Dyeing regenerated cellulose materials. 4,875. February 13.

Carpmael, A. (I.G. Farbenindustrie Akt.-Ges.). Manufacture of 1-halogen-2-amino-naphthalene sulphonic acids. 4,711 February 12.

Chemical Works, formerly Sandoz, and Ellis, G. B. Manufacture of non-dyeing mordants, etc. 4,891. February 13.

Chemical Works, formerly Sandoz. Manufacture of anthraquinone derivatives. 4,890. February 13. (Germany, March 27, 1928.)

Commercial Solvents Corporation. Process for preparing normal butyl alcohol, etc. 4,513. February 11. (United States, February 17, 1928.)

Fong, Y. S. Manufacture of sodium glutamate. 5,050. February 14.

Friederich, W. Manufacture of nitrous oxide. 5,097. February 15. (Germany, April 27, 1928.)

Hauschka, R., and Porn, M. Manufacture of synthetic resin. 5,219. February 16.

I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Apparatus for low-temperature distillation, etc. 4,537. February 11.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of mixed fertilisers. 4,538. February 11.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of nitriles. 4,540. February 11.

I.G. Farbenindustrie Akt.-Ges. and Imsay O. Y. Manufacture of plastic masses from cellulose derivatives. 4,704. February 12.

I.G. Farbenindustrie Akt.-Ges. and Johnson J. Y. Production of vat dyestuffs. 4,841. February 13.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of phosphoric acid, etc. 5,124. February 15.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Dehydration. 5,125. February 15.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of valuable salt mixtures. 5,126. February 15.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of derivatives of benzanthrone. 5,127. February 15.

I.G. Farbenindustrie Akt.-Ges. Preserving, etc., media. 4,574. February 11 (Germany, February 9, 1928.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of cellulose ethers. 4,590. February 11. (Germany, February 10, 1928.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of soluble cellulose esters. 4,591. February 11. (Germany, February 11, 1928.)

I.G. Farbenindustrie Akt.-Ges. Process for welding, etc., metals. 4,824. February 13. (Germany, February 13, 1928.)

I.G. Farbenindustrie Akt.-Ges. Producing coloured forms of cellulose esters. 5,004. February 14. (Germany, March 29, 1928.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of aliphatic carboxylic acids. 5,040. February 14. (Germany, February 15, 1928.)

I.G. Farbenindustrie Akt.-Ges. Production of anhydrous chlorides. 5,063. February 14. (Germany, April 24, 1928.)

I.G. Farbenindustrie Akt.Ges. Dyeing viscose. 5,156. February 15. (Germany, February 17, 1928.)

Imperial Chemical Industries, Ltd. Fluid-pressure engines. 4,918. February 14.

Imperial Chemical Industries, Ltd. and Woolcock, J. W. Production of acetaldehyde from ethyl alcohol. 5,111. February 15.

Jost, F. Production of alkali nitrates. 5,006. February 14. (Germany, February 14, 1928.)

Kuhn, R. Manufacture of polymethine dyestuffs. 4,887. February 13.

Palazzo, F. Production of precipitated dicalcium phosphate, etc. 5,038. February 14. (Italy, August 1, 1928.)

Palazzo, F. C. Production of precipitated dicalcium phosphate, etc. 5,038. February 14. (Italy, August 1, 1928.)

Poore, P. Production of acetic acid, etc. 5,017. February 14.

Scottish Dyes, Ltd. Halogenated bodies. 4,559. February 11.

Shine, G. T. Production of barium monoxide. 4,515. February 11.

Soc. of Chemical Industry in Basle. Process for dyeing tanned leather. 4,593. February 11. (Switzerland, February 9, 1928.)

Winterstein, A. Manufacture of polymethine dyestuffs. 4,887. February 13.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID BORIC, COMMERCIAL.—Crystal, £30 per ton; powder, £32 per ton; extra fine powder, £34 per ton.

ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.

ACID NITRIC, 80° TW.—£21 10s. to £27 per ton, makers' works, according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.

BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.

BLEACHING POWDER.—Spot, £9 10s. per ton d/d; Contract, £8 10s per ton d/d, 4-ton lots.

BORAX, COMMERCIAL.—Crystals, £19 10s. to £20 per ton; granulated, £19 per ton; powder. £21 per ton. (Packed in 2 cwt. bags carriage paid any station in Great Britain.)

CALCIUM CHLORIDE (SOLID).—£5 to £5 5s. per ton d/d carr. paid.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 3d. to 1s. 8d. per gall. pyridinised industrial, 1s. 5d. to 1s. 10d. per gall.; mineralised 2s. 4d. to 2s. 8d. per gall.; 64 O.P., 1d. extra in all cases.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE.—4½d. per lb.

POTASSIUM CHLORATE.—3⅞d. per lb., ex-wharf, London, in cwt. kegs.

SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.

SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

SODA CRYSTALS.—£5 to £5 5s. per ton, ex railway depots or ports.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.

SODIUM BICHROMATE.—3½d. per lb.

SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.r. London.

SODIUM CHLORATE.—2¾d. per lb.

SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.

SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.

SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.

SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.

SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.

SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.b. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—6½d. to 6¾d. per lb. Crude 60's, Feb./Mar., 1s. 10½d. per gall.

ACID CRESYLIC 99/100.—2s. 5d. to 2s. 10d. per gall. 97/99.—2s. 2d. to 2s. 3d. per gall. Pale, 95%, 1s. 11d. to 2s. per gall. Dark, 1s. 9d. to 1s. 10d.

ANTHRACENE.—A quality, 2d. to 2½d. per unit. 40%, £5 per ton.

ANTHRACENE OIL, STRAINED.—7¾d. to 8d. per gall. Unstrained, 7¼d. to 7½d. per gall.

BENZOLE.—Prices at worls: Crude, 10d. to 10½d. per gall.; Standard Motor, 1s. 4d. to 1s. 4½d. per gall.; 90%, 1s. 7d. to 1s. 8d. per gall; Pure, 1s. 10d. to 1s. 11d. per gall.

TOLUOLE.—90%, 1s. 5d. to 1s. 9d. per gall. Firm. Pure, 1s. 10d. to 2s. 2d. per gall.

XYLOL.—1s. 3d. to 1s. 11d. per gall. Pure, 1s. 6d. to 1s. 7d. per gall.

CREOSOTE.—Cresylic, 20/24%, 8¼d. per gall.; Heavy, 7d. to 7½d. per gall. Middle oil, 5¾d. to 6¼d. per gall. Standard specification, 5¼d. to 5½d. per gall. ex works. Salty, 7½d. per gall.

NAPHTHA.—Crude, 8½d. to 9d. per gall. Solvent, 90/160, 1s. 1½d. to 1s. 2½d. per gall. Solvent, 95/160, 1s. 2d. to 1s. 6d. per gall. Solvent 90/190, 11d. to 1s. 3d. per gall.

NAPHTHALENE, CRUDE.—Drained Creosote Salts, £5 per ton. Whizzed, £5 per ton. Hot pressed, £8 10s. per ton.

NAPHTHALENE.—Crystals, £12 5s. to £14 10s. per ton. Quiet Flaked, £14 to £15 per ton, according to districts.

PITCH.—Medium soft, 33s. 6d. to 36s. per ton, f.o.b., according to district. Nominal.

PYRIDINE.—90/140, 4s. 3d. to 6s. 6d. per gall. 90/180, 2s. 3d. to 3s. per gal. Heavy, 1s. 9d. to 2s. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—6s. per lb. 100%.

ACID BENZOIC.—1s. 8½d. per lb.

ACID GAMMA.—4s. 6d. per lb.

ACID H.—3s. per lb.

ACID NAPHTHIONIC.—1s. 6d. per lb.

ACID NEVILLE AND WINTHER.—4s. 9d. per lb.

ACID SULPHANILIC.—8½d. per lb.

ANILINE OIL.—8d. per lb. naked at works.

ANILINE SALTS.—8d. per lb. naked at works.

BENZALDEHYDE.—2s. 3d. per lb.

BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.

BENZOIC ACID.—1s. 8½d. per lb.

o-CRESOL 29/31° C.—5½d. per lb.

m-CRESOL 98/100%.—2s. 3d. to 2s. 6d. per lb.

p-CRESOL 32/34° C.—2s. 3d. to 2s. 6d. per lb.

DICHLORANILINE.—1s. 10d. per lb.

DIMETHYLANILINE.—1s. 11d. per lb.

DINITHROBENZENE.—8d. per lb. naked at works. £75 per ton.

DINITROCHLORBENZENE.—£84 per ton d/d.

DINITROTOLUENE.—48/50° C. 7½d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.

DIPHENYLAMINE.—2s. 10d. per lb. d/d.

a-NAPHTHOL.—2s. per lb. d/d.

B-NAPHTHOL.—10d. per lb. d/d.

a-NAPHTHYLAMINE.—1s. 3d. per lb.

B-NAPHTHYLAMINE.—3s. per lb.

o-NITRANILINE.—5s. 9d. per lb.

m-NITRANILINE.—3s. per lb. d/d.

p-NITRANILINE.—1s. 8d. per lb.

NITROBENZENE.—6d. per lb. naked at works.

NITRONAPHTHALENE.—1s. 3d. per lb.

R. SALT.—2s. 2d. per lb.

SODIUM NAPHTHIONATE.—1s. 8½d. per lb. 100% basis d/d.

o-TOLUIDINE.—8d. per lb.

p-TOLUIDINE.—1s. 9d. per lb. naked at works.

m-XYLIDINE ACETATE.—2s. 6d. per lb. 100%.

N. W. ACID.—4s. 9d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 15s. to £10 5s. per ton. Grey, £16 10s. to £17 10s. per ton. Liquor, 9d. per gall.

ACETONE.—£78 per ton.

CHARCOAL.—£6 to £8 10s. per ton, according to grade and locality.

IRON LIQUOR.—1s. 3d. per gall. 32° Tw. 1s. per gall. 24° Tw.

RED LIQUOR.—9d. to 10½d. per gall. 16° Tw.

WOOD CRESOTE.—1s. 9d. per gall. Unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 8d. to 3s. 11d. per gall. Solvent, 4s. to 4s. 3d. per gall.

WOOD TAR.—£3 10s. to £4 10s. per ton.

BROWN SUGAR OF LEAD.—£38 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 3d. per lb. according to quality; Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—1s. 9d. per lb.

BARYTES.—£5 10s. to £7 per ton, according to quality.

CADMIUM SULPHIDE.—5s. to 6s. per lb.

CARBON BISULPHIDE.—£25 to £27 10s. per ton, according to quantity

CARBON BLACK.—5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£45 to £54 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 9d. per lb.

INDIARUBBER SUBSTITUTES, WHITE AND DARK.—4⅝d. to 5⅞d. per lb.

LAMP BLACK.—£32 10s. per ton, barrels free.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPHONE, 30%.—£23 per ton.

MINERAL RUBBER "RUBPRON."—£13 12s. 6d. per ton, f.o.r. London.

SULPHUR.—£10 to £12 per ton, according to quality.

SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra.

SULPHUR PRECIP. B. P.—£55 to £60 per ton.

THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb., carriage paid.

THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.

VERMILION, PALE OR DEEP.—6s. 10d. to 7s. per lb.

ZINC SULPHIDE.—8d. to 11d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£39 per ton ex wharf London in glass containers.

ACID, ACETYL SALICYLIC.—2s. 4½d. to 2s. 5d. per lb.

ACID, BENZOIC, B.P.2s. to 3s. 3d. per lb., according to quantity. Solely ex Gum, 1s. 3d. to 1s. 6d. per oz., according to quantity.

ACID, BORIC B.P.—Crystal, 36s. to 39s. per cwt.; powder, 40s. to 43s. per cwt.; extra fine powder, 42s. per cwt., according to quantity. Carraige paid any station in Great Britain, in ton lots.
ACID, CAMPHORIC.—19s. to 21s. per lb.
ACID, CITRIC.—2s. 1d. to 2s. 2d. per lb., less 5%.
ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.
ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d.
ACID, SALICYLIC, B.P. PULV.—1s. 6d. to 1s. 7d. per lb. Technical.—10½d. to 11½d. per lb.
ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.
ACID, TARTARIC.—1s. 4½d. per lb., less 5%.
ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.
AMIDOL.—7s. 6d. to 9s. per lb., d/d.
AMIDOPYRIN.—7s. 9d. to 8s. per lb.
AMMONIUM BENZOATE.—3s. 3d. to 3s. 6d. per lb., according to quantity. 18s. per lb. ex Gum.
AMMONIUM CARBONATE B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimated, 1s. per lb.
ATROPHINE SULPHATE.—9s. per oz.
BARBITONE.—5s. 9d. to 6s. per lb.
BENZONAPHTHOL.—3s. to 3s. 3d. per lb. spot.
BISMUTH CARBONATE.—9s. 9d. per lb.
BISMUTH CITRATE.—9s. 3d. per lb.
BISMUTH SALICYLATE.—8s. 9d. per lb.
BISMUTH SUBNITRATE.—8s. 3d. per lb.
BISMUTH NITRATE.—Cryst. 5s. 9d. per lb.
BISMUTH OXIDE.—12s. 3d. per lb.
BISMUTH SUBCHLORIDE.—10s. 9d. per lb.
BISMUTH SUBGALLATE.—7s. 9d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.
BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 0½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W Qts. 11d. per lb.
BORAX B.P.—Crystal, 24s. to 27s. per cwt.; powder, 25s. to 28s. per cwt., according to quantity. Carriage paid any station in Great Britain, in ton lots.
BROMIDES.—Ammonium, 2s. to 2s. 3d. per lb.; potassium, 1s. 8½d. to 1s. 11½d. per lb.; sodium, 1s. 11d. to 2s. 2d. per lb.; granulated, ½d. per lb. less; all spot. Large quantities at lower rates.
CALCIUM LACTATE.—B.P., 1s. 3d. to 1s. 4d. per lb.
CAMPHOR.—Refined flowers, 2s. 11d. to 3s. per lb., according to quantity; also special contract prices.
CHLORAL HYDRATE.—3s. 2d. to 3s. 4d. per lb.
CHLOROFORM.—2s. 5½d. to 2s. 7½d. per lb., according to quantity.
CREOSOTE CARBONATE.—6s. per lb.
ETHERS.—S.G. ·730—11d. to 1s. per lb., according to quantity other gravities at proportionate prices.
FORMALDEHYDE, 40%.—37s. per cwt., in barrels, ex wharf.
GUAIACOL CARBONATE.—4s. 6d. to 4s. 9d. per lb.
HEXAMINE.—1s. 11d. to 2s. 2d. per lb.
HOMATROPINE HYDROBROMIDE.—30s. per oz.
HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.
HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. Winchesters, 2s. 11d. per gall. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 4s. per gall.
HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.
HYPOPHOSPHITES.—Calcium, 2s. 9d. per lb.; potassium, 3s. per lb.; sodium, 2s. 11d. per lb., in 1 cwt. lots, assorted.
IRON AMMONIUM CITRATE.—B.P., 2s. 8d. to 2s. 11d. per lb. Green, 3s. 1d. to 3s. 4d. per lb.; U.S.P., 2s. 9d. to 3s. per lb.
IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.
IRON QUININE CITRATE.—B.P., 8¾d. to 9¼d. per oz., according to quantity.
MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.
MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.
MENTHOL.—A.B.R. recrystallised B.P., 23s. per lb. net; Synthetic, 11s. to 12s. 6d. per lb.; Synthetic detached crystals, 11s. to 16s. per lb., according to quantity; Liquid (95%), 9s. 6d. per lb.
MERCURIALS B.P.—Up to 1 cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide, 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.
METHYL SALICYLATE.—1s. 3d. to 1s. 6d. per lb.
METHYL SULPHONAL.—8s. 9d. to 9s. per lb.
METOL.—9s. to 11s. 6d. per lb. British make.
PARAFORMALDEHYDE.—1s. 9d. per lb. for 100% powder.
PARALDEHYDE.—1s. 4d. per lb.
PHENACETIN.—2s. 5d. to 2s. 8d. per lb.
PHENAZONE.—3s. 9d. to 4s. per lb.
PHENOLPHTHALEIN.—6s. to 6s. 3d. per lb.
POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—96s. per cwt., less 2½ per cent.
POTASSIUM CITRATE.—B.P.C., 2s. 6d. to 2s. 9d. per lb.
POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.
POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.
POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included f.o.r. London.
POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.
QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins.
RESORCIN.—2s. 10d. to 3s. per lb., spot.
SACCHARIN.—47s. per lb.; in quantity lower.
SALOL.—2s. 3d. to 2s. 6d. per lb.
SODIUM BENZOATE, B.P.—1s. 8d. to 1s. 11d. per lb.
SODIUM CITRATE, B.P.C., 1911.—2s. 3d. to 2s. 6d. per lb., B.P.C. 1923—2s. 8d. to 2s. 9d. per lb. U.S.P., 2s. 6d. to 2s. 9d. per lb., according to quantity.
SODIUM FERROCYANIDE.—4d. per lb., carriage paid.
SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.
SODIUM NITROPRUSSIDE.—16s. per lb.
SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—95s. to 100s. per cwt. Crystals, 5s. per cwt. extra.
SODIUM SALICYLATE.—Powder, 1s. 5½d. to 1s. 7d. per lb. Crystal, 1s. 6½d. to 1s. 8d. per lb.
SODIUM SULPHIDE, PURE RECRYSTALLISED.—10s. to 1s. 1d. per lb.
SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £28 10s. per ton, according to quantity. Delivered U.K.
SULPHONAL.—6s. 6d. to 6s. 9d. per lb.
TARTAR EMETIC, B.P.—Crystal or powder, 2s. 1d. to 2s. 3d. per lb.
THYMOL.—Puriss., 9s. 6d. to 9s. 9d. per lb., according to quantity. Firmer. Natural, 12s. 6d. per lb.

Perfumery Chemicals

ACETOPHENONE.—6s. 6d. per lb.
AUBEPINE (EX ANETHOL).—11s. per lb.
AMYL ACETATE.—2s. 6d. per lb.
AMYL BUTYRATE.—4s. 6d. per lb.
AMYL SALICYLATE.—2s. 9d. per lb.
ANETHOL (M.P. 21/22° C.).—5s. 3d. per lb.
BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—1s. 10d. per lb.
BENZYL ALCOHOL FREE FROM CHLORINE.—1s. 10d. per lb.
BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.
BENZYL BENZOATE.—2s. 3d. per lb.
CINNAMIC ALDEHYDE NATURAL.—15s. 6d. per lb.
COUMARIN.—8s. 6d. per lb.
CITRONELLOL.—10s. per lb.
CITRAL.—8s. 3d. per lb.
ETHYL CINNAMATE.—6s. per lb.
ETHYL PHTHALATE.—2s. 9d. per lb.
EUGENOL.—14s. per lb.
GERANIOL (PALMAROSA).—22s. per lb.
GERANIOL.—6s. 6d. to 10s. per lb.
HELIOTROPINE.—4s. 9d. per lb.
ISO EUGENOL.—16s. per lb.
LINALOL.—Ex Bois de Rose, 13s. per lb. Ex Shui Oil, 9s. 3d. per lb.
LINALYL ACETATE.—Ex Bois de Rose, 17s. 6d. per lb. Ex Shui Oil Linalol. 10s. 6d. per lb.
METHYL ANTHRANILATE.—8s. per lb.
METHYL BENZOATE.—4s. per lb.
MUSK KETONE.—34s. per lb.
MUSK XYLOL.—7s. per lb.
NEROLIN.—3s. 9d. per lb.
PHENYL ETHYL ACETATE.—11s. per lb.
PHENYL ETHYL ALCOHOL.—10s. per lb.
RHODINOL.—48s. per lb.
SAFROL.—1s. 8d. per lb.
TERPINEOL.—1s. 6d. per lb.
VANILLIN.—18s. 6d. per lb.

Essential Oils

ALMOND OIL.—Foreign S.P.A., 9s. 6d. per lb.
ANISE OIL.—2s. 9d. per lb.
BERGAMOT OIL.—23s. per lb.
BOURBON GERANIUM OIL.—21s. per lb.
CAMPHOR OIL.—10d. per lb.
CANANGA OIL, JAVA.—12s. per lb.
CINNAMON OIL LEAF.—7s. 9d. per oz.
CASSIA OIL, 80/85%.—6s. per lb.
CITRONELLA OIL.—Java, 2s. 2d. per lb., c.i.f. U.K. port. Ceylon, pure, 1s. 10½d. per lb.
CLOVE OIL (90/92%).—11s. 6d. per lb.
EUCALYPTUS OIL, AUSTRALIAN, B.P. 70/75%.—2s. per lb.
LAVENDER OIL.—Mont Blanc, 38/40%, 17s. 6d. per lb.
LEMON OIL.—14s. 9d. per lb.
LEMONGRASS OIL.—4s. per lb.
ORANGE OIL, SWEET.—21s. per lb.
OTTO OF ROSE OIL.—Anatolian, 35s. per oz. Bulgarian, 75s. per oz.
PALMA ROSA OIL.—13s. per lb.
PEPPERMINT OIL.—English, 87s. 6d. per lb.; Wayne County, 15s. 6d. per lb.; Japanese, 8s. per lb.
PETITGRAIN.—9s. 3d. per lb.
SANDALWOOD.—Mysore, 28s. per lb.; 90/95%, 18s. 9d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, February 21, 1929.

THE business booked during the current week has been quite satisfactory; prices remain generally firm and steady. The export trade has also been quite steady.

General Chemicals

ACETATE OF SODA.—Firm at £21 5s. to £22 5s. per ton.

ACETIC ACID.—In steady demand at £36 10s. per to nfor technical 80%, and £37 10s. per ton for pure 80%.

ACETONE.—£77 to £85 per ton, according to quantity with a good demand, but supplies short for early delivery.

ACID CITRIC.—Remains very slow at about 2s. 1d. to 2s. 3d. per lb. less 5%.

ACID FORMIC.—Unchanged at about £42 10s. per ton for 85%, and in steady demand.

ACID LACTIC.—Unchanged at £43 per ton for 30% by weight.

ACID OXALIC.—The improved demand continues with price firm at £30 10s. to £32 10s. per ton.

TARTARIC ACID.—Rather quiet at 1s. 4½d. per lb., less 5%, with a firm forward position.

AMMONIUM CHLORIDE.—Firmer.

ARSENIC.—Unchanged.

BARIUM CHLORIDE.—Still very firm, with supplies short for early delivery. Spot parcels unchanged at about £11 10s. to £12 per ton.

CREAM OF TARTAR.—Unchanged at £93 to £97 per ton for 99/100% B.P.; forward position firm.

COPPER SULPHATE.—Unchanged.

FORMALDEHYDE.—Steady, at about £39 per ton, and the forward position firm.

LEAD ACETATE.—Unchanged at £42 10s. per ton for white, and £41 10s. per ton for brown; position firm with a steady demand.

LEAD NITRATE.—Unchanged at £36 per ton, carriage paid.

LIME ACETATE.—£18 per ton and in very short supply for early delivery.

LITHOPONE.—£19 15s. to £21 per ton.

METHYL ACETONE.—Steady at £58 to £60 per ton.

POTASSIUM CARBONATE AND CAUSTIC.—Unchanged.

POTASSIUM CHLORATE —£28 to £30 per ton

PERMANGANATE OF POTASH —Firm at 5½d. per lb. and in good demand.

POTASH PRUSSIATE.—Continues firm at £63 10s. to £65 10s. perton, according to quantity, with a good demand.

SODIUM BICHROMATE.—Unchanged at 3½d. per lb., with rebates for contracts.

SODIUM CHLORATE.—In good demand at £25 per ton.

SODIUM HYPOSULPHITE.—Unchanged at British makers' prices.

SODIUM NITRITE.—In quite good demand, at £20 per ton.

SODIUM PHOSPHATE.—£12 per ton for di-basic and £17 10s. per ton for tri-basic, with a fair inquiry.

SODIUM PRUSSIATE.—Remains firm at 4½d. to 5½d. per lb., according to quantity, and in good demand.

SODIUM SULPHIDE.—Unchanged at British makers' prices.

SULPHATE OF ALUMINA.—There is a steady inquiry; price firm at £7 5s. to £8 per ton.

TARTAR EMETIC.—Steady at 10½d. per lb.

ZINC SULPHATE.—Unchanged at £12 per ton.

Coal Tar Products

There is little change to report in the prices of coal tar products from last week, although the slightly better tone is maintained.

MOTOR BENZOL remains scarce, the price being about 1s. 7½d. to 1s. 8d. per gallon, f.o.r. makers' works.

SOLVENT NAPHTHA is unchanged, at 1s 1½d. per gallon f.o.r.

HEAVY NAPHTHA is quoted at 1s. 1d. to 1s. 1½d. per gallon on rails.

CREOSOTE OIL is unchanged at about 5½d. per gallon on rails in the North, and at about 6d. per gallon in London.

CRESYLIC ACID remains weak, the 98/100% quality being quoted at about 1s. 10d. per gallon, and the dark quality 95/97% at about 1s. 8d. per gallon f.o.b.

NAPHTHALENE.—The firelighter quality is quoted at about £4 10s. per ton, the 74/76 quality at £5 per ton, and the 76/78 quality at £6 to £6 5s. per ton.

PITCH is unchanged, at 32s. 6d. to 35s. per ton f.o.b.

Nitrogen Products

Sulphate of Ammonia.—The demand for sulphate of ammonia continues quiet, but we understand that stocks in consuming countries are being reduced. The price remains firm at £10 2s. per ton, f.o.b. U.K. port, in single bags.

Home.—The continuance of the severe frost has caused a set-back in the home demand. Most merchants consider, however, that it will have little effect other than the postponement of orders.

Nitrate of Soda.—Good demand continues, and it is reported from the United States that the price in that country has moved up 10 cents per ton.

Latest Oil Prices

LONDON, February 20.—LINSEED OIL was quiet at occasionally 2s. 6d. to 5s. per ton decline; spot, ex mill, £31; March-April, £29; May-August, £29 10s.; and September-December, £30, naked. RAPE OIL was quiet. Crude extracted, £42 10s.; technical refined, £44 10s., naked, ex-wharf. COTTON OIL was steady. Egyptian crude, £28 10s.; refined common edible, £34; and deodorised, £36, naked, ex mill. TURPENTINE was inactive. American, spot, 46s.; and March-April, 46s. 6d. per cwt.

HULL.—LINSEED OIL.—Spot to April, £29 2s. 6d.; May-August, £29 7s. 8d.; September-December, £29 15s. per ton, naked. COTTON OIL.—Bombay crude, £27 10s.; Egyptian crude spot (new), and February-April, £28 5s.; edible refined spot and February-April, £31 15s.; technical, spot, £31 10s.; deodorised, spot, £33 15s. per ton, naked. PALM KERNEL OIL.—Crude, 5½ per cent., £36 10s. per ton, naked. GROUNDNUT OIL.—Crushed/extracted, £36 10s.; deodorised, £40 10s. per ton. SOYA OIL.—Extracted and crushed, £31; deodorised, £34 10s. per ton. RAPE OIL.—Crushed/extracted, £43 10s.; refined, £45 10s. per ton. TURPENTINE.—Spot, 48s. per cwt., net cash terms, ex-mill. CASTOR OIL and COD OIL unchanged.

South Wales By-Products

SOUTH WALES by-product activities are slightly better. General inquiry has strengthened and more business has been done. Pitch has a brighter tone, but values are unchanged and nominal round 33s. to 36s. per ton. Crude tar is unchanged round about 30s. to 32s. per ton producers' works, but there is only a small call for it. Road tar continues weak and values have fallen to from 11s. to 14s. per 40 gallons barrel. Solvent naphtha is in better demand and values are steady round 1s. 2d. to 1s. 4d. per gallon. Heavy naphtha is quiet at a ruling price of about 1s. per gallon. Refined tars continue to have a steady, if moderate, call. Values are unchanged, coke oven tar being quoted at from 7d. to 7¾d. per gallon delivered, and gasworks' tar at from 6½d. to 7d. per gallon delivered. Crude naphthalene is unchanged at about 80s. per ton, and has scarcely any call. Whizzed is quiet round 100s. per ton. Patent fuel and coke exports are not quite so good, but the decrease is due partly to the holding up of shipping by the severe weather. Patent fuel prices are unchanged, ex-ship Cardiff, being quoted from 21s. to 21s. 6d. per ton; ex-ship Swansea, 19s. to 19s. 3d. per ton. Coke, best foundry, 32s. 6d. to 36s. 6d.; good foundry, 26s. 6d. to 32s., and furnace from 19s. to 21s. per ton.

Increased German Ammonium Sulphate Production

IT is stated that the Ruhr Chemie A.-G., which has erected plant to work on the Concordia-Linde and Casale principles, is shortly to commence production of synthetic nitrogen compounds, probably at the beginning of April. Hydrogen will be obtained from the coke-oven gas of the Gute Hoffnungshütte foundries, and combined with atmospheric nitrogen at 350° C., under 660 atmospheres pressure. The initial production will be 250,000—300,000 tons of ammonium sulphate per annum, equivalent to 50—60 tons of pure nitrogen per day. Power will be obtained by the use of powdered fuel.

Light Castings Combine

THE DIRECTORS of the Sinclair Iron Co., Ltd., in a letter to their shareholders, set out the terms on which they are proposing to join in a new combine which will include several important firms in the light castings industry. The directors have entered into a provisional agreement with Austin Friars Trust, Ltd., for the formation of a new company, to be called Associated Foundries, Ltd., or some other suitable title, and on the board of which the Sinclair Iron Co. will be adequately represented, to acquire the shares of the company and of Abbots Foundry Co., Burton Foundry Co., R. W. Crosthwaite, Ltd., Falkirk Iron Co., James Clay (Wellington), Ltd., Light Castings, Ltd., Forth and Clyde and Sunnyside Iron Co., Ltd., and Callendar Iron Co., Ltd. Further negotiations are pending.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, February 20, 1929.

THE heavy chemical market has, during the past week, been rather slack, and there is nothing of importance to record. Prices, notwithstanding the lack of demand, show little change.

Industrial Chemicals

ACETONE.—B.G.S., £77 10s. to £85 per ton, ex wharf, according to quantity. There is still little available for immediate delivery.

ACID ACETIC, 98/100%.—Glacial, £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports; 80% pure, £37 10s. per ton, ex wharf; 80% technical, £37 10s. per ton, ex wharf.

ACID BORIC.—Crystals, granulated or small flakes, £30 per ton; powder, £32 per ton, packed, in bags, carriage paid, U.K. stations.

ACID CARBOLIC, ICE CRYSTALS.—Rather easier and quoted now at 6¼d. per lb., delivered or f.o.b. U.K. ports.

ACID CITRIC, B.P. CRYSTALS.—Rather easier and now quoted about 2s. 2½d. per lb., less 5%, ex store, spot delivery. Rather cheaper to come forward.

ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy. Dearsenicated quality, 5s. 6d. per carboy, ex works, full wagon loads.

ACID NITRIC, 80°.—Quality, £24 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—Spot material quoted 3¼d. per lb. Offered for prompt shipment from the Continent at about 3¼d. per lb., ex wharf.

ACID SULPHURIC.—£2 15s. per ton, ex works, for 144° quality, £5 15s. per ton, for 168° quality. Dearsenicated quality, 20s. per ton extra.

ACID TARTARIC, B.P. CRYSTALS.—Quoted 1s. 4d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—On offer at £5 10s. per ton, c.i.f. U.K. ports. Spot material quoted £5 15s. per ton, ex store.

ALUM, LUMP POTASH.—Rather dearer and now quoted £8 12s. 6d. per ton, c.i.f. U.K. ports. Crystal meal on offer at £9 per ton, ex store.

AMMONIA ANHYDROUS.—Quoted 9½d. per lb., carriage paid. Containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton; powdered, £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Unchanged at about £39 per ton, ex store, spot delivery. Quoted £35 15s. per ton, c.i.f. U.K. ports, prompt shipment from China.

ARSENIC, WHITE POWDERED.—Quoted £18 10s. per ton, ex wharf, prompt despatch from mines. Spot material on offer at £19 15s. per ton, ex store.

BARIUM CHLORIDE.—On offer from the Continent at £10 5s. per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 12s. 6d. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price £4 5s. to £4 15s. per ton, according to quality and point of delivery. Continental material on offer at £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works, or £4 12s. 6d. per ton, f.o.b. U.K. ports.

COPPER SULPHATE.—Steady and price about £25 15s. per ton, ex wharf.

FORMALDEHYDE, 40%.—Good inquiry and price unchanged at about £37 10s. per ton, ex store.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 5s. per ton, ex wharf.

LEAD, RED.—On offer at £29 15s. per ton, ex store.

LEAD, WHITE.—Quoted £37 10s. per ton, c.i.f. U.K. ports.

LEAD ACETATE.—White crystals quoted £41 10s. per ton. Brown on offer about £39 10s. per ton, ex store.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store. In moderate demand.

METHYLATED SPIRIT.—Industrial quality 64 O.P. quoted 1s. 4d. per gallon, less 2½% delivered.

POTASSIUM BICHROMATE.—Quoted 4¼d. per lb., delivered U.K. or c.i.f. Irish ports with an allowance of 2½% for minimum 2½ tons to be taken during six months.

POTASSIUM CARBONATE, 96/98%.—Offered from the Continent, £25 10s. per ton, c.i.f. U.K. Spot material quoted £26 10s. per ton, ex store.

POTASSIUM CHLORATE, 99¾/100% POWDER.—Spot material now quoted £25 per ton, ex wharf. Rather cheaper to come forward.

POTASSIUM NITRATE.—Refined granulated quality quoted £19 2s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 5¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Offered for prompt shipment from the Continent at 6¾d. per lb., ex wharf. Spot material quoted 7d. per lb., ex store.

SODA CAUSTIC.—Powdered, 98/99%, now £17 10s. per ton, in drums; £18 15s. per ton, in casks; solid, 76/77%, £14 10s. per ton, in drums; 70/72%, £14 2s. 6d. per ton, in drums, all carriage paid buyers station, minimum 4 ton lots, for contracts, 10s. per ton less.

SODIUM ACETATE.—65% material on offer at about £19 15s. per ton, ex wharf.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—3½d. per lb., delivered U.K. or c.i.f. Irish ports, less 2½% for contract of minimum 2½ tons.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station; powdered or pea quality, 27s. 6d. per ton, Extra light soda ash, £7 13s. per ton, ex quay, minimum 4 ton lots with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum 4-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum 4-ton lots. Prices for this year unchanged.

SODIUM NITRATE.—Price now £10 10s. per ton, carriage paid buyers' sidings, minimum 6-ton lots, usual extras for small quantities and refined qualities.

SODIUM SULPHATE (SALTCAKE).—Prices 50s. per ton, ex works, 52s. 6d. per ton, delivered, for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption. Solid, 60/62%, £9 per ton. Broken, 60/62%, £10 per ton. Crystals, 30/32%, £7 2s. 6d. per ton, delivered buyers' works on contract, minimum 4-ton lots. Special prices for some consumers. Spot material 5s. per ton extra. Prices for this year unchanged.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £10 7s. 6d. per ton; ground American, £9 5s. per ton, ex store.

ZINC CHLORIDE, 98%.—British material now quoted £22 10s. per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Offered from the Continent at about £10 5s. per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Benn Brothers' Dramatic Circle

THE annual performance of the Dramatic Section of Benn Brothers' Social Circle was given at the King George's Hall, Tottenham Court Road, London, on Friday, February 15. In contrast to the usual light comedies and farces that have been performed in previous years, the play selected was *The Creaking Chair*, a mystery play of A. T. Wilkes. In the capable hands of the producer, Mr. H. J. Wrench (of THE CHEMICAL AGE staff), the choice proved to be an excellent one, and the audience thoroughly enjoyed the numerous sensations and thrills that the play provided. The cast was as follows: Messrs. H. W. Duck, H. G. Fraser, C. E. Payne, K. E. Hughes, G. P. Grieve, E. G. Benn, J. W. MacTavish, H. J. Bryant, W. J. Inglis, the Misses P. Trimby, M. M. Smith, M. D. Johns, and Mrs. K. Duck.

Nova Scotia Advisory Fuel Board

EARLY in the year an Advisory Fuel Board was formed for the investigation of Nova Scotia fuels, this body consisting of representatives of the two large Canadian railways, the Nova Scotia Light and Power Co., the coal producers, the Dominion and Provincial Departments of Mines, the Nova Scotia Technical College, and others. A series of boiler trials and chemical analyses of coal now being mined for commercial purposes has been set on foot, and the results are being tabulated for the information of producers and consumers of coal.

Manchester Chemical Market

(From Our Own Correspondent).

Manchester, February 21, 1929.

Deliveries of heavy chemical products against contracts, principally to consumers in the texitile trades, have been on a fair scale during the past week. With regard to transactions in the open market, buying interest in chemicals seem to be up to its recent level and although not heavy individually a fair number of transactions have been reported, both for prompt and early delivery, at prices which are steady, pretty well all round.

Heavy Chemicals

In the case of sulphide sodium, there is a moderate movement of this material going on and values are maintained, the 60-65 per cent. concentrated solid quality being quoted at round £9 10s. per ton and the commercial at £8. There is a quiet demand about for bleaching powder, offers of which are in the neighbourhood of £7 per ton. Prussiate of soda is well held at from 4½d. to 5¼d. per lb., according to quantity, and buying interest in this section keeps up. Phosphate of soda keeps steady at about £12 5s. per ton, although there is no big weight of business going through. Hyposulphite of soda is in moderate request and values are held, from £9 5s. to £9 10s. per ton being asked for the commercial grade and about £15 10s. per ton for the photographic. There has been no alteration in the price position of caustic soda, quotations for which range from £12 15s. to £14 per ton, according to quality, or in alkali at about £6 per ton, both of which are fairly active sections of the market. Bicarbonate of soda also meets with a moderate amount of inquiry and quotations keep up at round £10 10s. per ton. With regard to saltcake, only a relatively quiet business in this material has been reported during the past week, prices varying from about £2 10s. to £2 15s. per ton. Bichromate of soda is attracting some attention and current offers are still on the basis of 3½d. per lb. In the case of chlorate of soda, there is not a great deal of business passing.

Among the potash products, yellow prussiate is moving in fair quantities and values are firm at from 6¾d. to 7¼d. per lb., according to quantity. A quiet trade is going through in the case of permanganate of potash, with the B.P. grade selling at about 5⅞d. per lb. and the commercial at from 5d. to 5⅛d. Caustic potash is well maintained at from £33 5s. per ton for prompt delivery of one to five-ton lots and a moderate inquiry for this material has been experienced during the past few days. Bichromate of potash is steady and fairly active at 4½d. per lb. Chlorate of potash is about unaltered at round 3d. per lb., and a moderate business is being transacted. Carbonate of potash is in quietly steady demand and prices are steady at from £26 to £26 5s. per ton, ex store.

Among the miscellaneous descriptions of chemical products, arsenic is doing a quiet trade at up to £16 10s. per ton, at the mines, for white powdered, Cornish makes. Sulphate of copper continues to display marked firmness although at £28 to £28 5s. per ton prices show no appreciable change on the week; meanwhile, the demand for this material keeps up on fairly satisfactory lines. Nitrate of lead is in moderate request at from £34 to £35 per ton, as are also white and brown acetate of lead at about £40 and £38 10s. to £39 per ton, espectively. With regard to acetate of lime a quiet business rs going through in both grey and brown material at £17 to £17 5s. per ton and £9.

Acids and Tar Products

Buying in the case of citric acid is largely of a hand-to-mouth character, with prices fairly steady at round 2s. 2d. per lb. Offers of tartaric acid are maintained at from 1s. 4d. per lb. and a moderate trade is being put through. There is a quietly steady demand about for acetic acid at firm prices, the 80 per cent. commercial product being quoted at about £36 per ton and the glacial at £66. Oxalic acid is in moderate request at £1 11s. 6d. per cwt.

In the by-products section, easiness is still a feature of pitch, and at down to £1 12s. 6d. per ton, f.o.b., buying this week has been on a restricted scale. Creosote oil, also, is slow and easy at round 4d. per gallon, naked. Solvent naphtha is well held at 1s. 1½d. per gallon and a moderate business is being done. Carbolic acid crystals are in steady inquiry at 6¼d. per lb., with crude 60's moving fairly freely at round 1s. 10d. per gallon.

Low Temperature Carbonisation

An Important Plant in the Steel Industry

Undoubtedly (a correspondent writes) the iron and steel industry generally is in urgent need of more scientific methods as regards utilisation of coal, and in this connection low temperature carbonisation has great possibilities, using all the rich clean gas for the furnace work in place of hot dirty producer gas, and recovering the maximum yield of low temperature tar. The Lukens Steel Co., of Coatesville, Pennsylvania, U.S.A., famous for high-grade boiler plates and flange steel, are now installing a large "K.S.G." low temperature carbonisation plant at their works, at an estimated cost of about £500,000.

The installation is to be completed in the early part of 1930, and will consist of six standard retorts, each with a throughput of 80 tons of coal per 24 hours, that is, about 3,500 tons for the complete setting, while arrangements are also being made to double the plant in the immediate future. The site is in Valley Township, about 1¼ miles west of Coatesville, and the gas—about 800 B.Th.U. per cubic foot—will be taken to the steel works furnaces by means of a supply main 5,000 ft. long, while the solid smokeless fuel, as well as the low temperature tar, will be available for separate sale.

Complete and efficient utilisation of the gas has always been one of the practical problems of the low temperature carbonisation of coal, but in Great Britain two of the most obvious fields are in connection with the manufacture of iron and steel, and also the town's gas industry, especially when linked up on scientific lines with coke oven plant, even assuming that the present 450-600 B.Th.U. per cubic foot town's gas is to remain the standard.

World War Casualties

Those interested in authoritative data concerning gas casualties in the war and the after-effects of these chemical reagents may secure from the Superintendent of Documents, Government Printing Office, Washington, D.C., at 35 cents per copy, "A Comparative Study of World War Casualties from Gas and Other Weapons," by Colonel Harry L. Gilchrist. Colonel Gilchrist, in this publication, has brought together data and other information from lectures delivered at the regular courses of the Chemical Warfare School at Edgewood and the Army Medical School at Washington. He has been closely associated with chemical warfare since the United States entered the world war. As commanding officer of British Hospital No. 9 at Rouen, France, as medical director of the Gas Service of the Chemical Warfare Service of the A.E.F. from December, 1917, to the close of the war, and as chief of the Medical Division and Medical Research Division of the Chemical Warfare Service since January, 1921, he has had an unusual opportunity to study carefully all such cases. In addition, Colonel Gilchrist is one of the Board of medical officers appointed in 1926 to study the residual effects of warfare gases. The publication comprises some 50 pages with a bibliography, together with 11 tables, 17 charts, and 7 illustrations.

Benzene Poisoning

J. J. Bloomfield, of the United States Public Health Service (*Pub. Health Rep.*, 1928, **43**, 1895-1897) suggests that benzene poisoning may occur in laboratories where benzene is used as a solvent in the analysis of such materials as rubber, paint, varnish and oil products, and in the cleaning of apparatus, or the removal of stains from the skin. In industrial plants, where the exposure to benzene vapour is continuous, a concentration of benzene as low as 100 parts per million of air is a substantial hazard. However, in laboratories, the use of benzene is usually intermittent. In chronic benzene poisoning, the leucocyte or white cell count of the blood is reduced to a considerable extent, the count falling to values below 5,000 per cubic millimeter. The differential leucocyte count, or the relative numbers of the various types of white cells, also undergoes changes; the per cent. of lymphocytes shows a relative increase, and the per cent. of polymorphonuclear cells a marked decrease. It is recommended that benzene be used only as a solvent, never as a cleansing agent. The further recommendation is made that it be replaced as a solvent by less toxic compounds, such as toluene, xylene, or high-flash naphtha. The health of the laboratory workers should be checked by means of blood counts made at intervals of one or two months.

Company News

BLUNDELL SPENCE AND CO.—For the year ended October 31, the net profits were £27,634. A dividend of 5 per cent. is proposed on the ordinary shares carrying £7,047 forward.

SHAWINIGAN POWER CO.—The directors announce a new stock issue on the basis of one new share at $50 for each six held by shareholders on the register on March 22.

RECKITT AND SONS, LTD.—A final dividend for the year ended December 31 last is recommended, at the rate of 2s. per share, less income-tax, on the ordinary share capital, making with the interim dividends already paid, 4s. 3d. per share f or the year.

SENTINEL WAGGON WORKS.—The report for 1928 shows a profit of £23,381, against £41,123 last year. Certain losses of capital incurred in endeavouring to extend the scope of the business and to provide housing accommodation for employees are to be dealt with by a capital reduction scheme. A total writing off of £62,604 is involved, which it is proposed to meet by reducing each of the £1 ordinary shares to 15s. and appropriating £12,000 from reserve and £604 out of the balance of £1,344 now carried forward.

JUTE INDUSTRIES, LTD.—A scheme for the reorganisation and reduction of the share capital was adopted at the annual meeting of shareholders in London on February 15. The chairman said that the fact of reconstruction was not going to make the assets of the company any more valuable or worth less, and it would not increase or decrease the profits. It would, however, enable the resumption of dividends to be made.

MATHER AND PLATT.—The directors recommend a final dividend of 5 per cent. and a bonus of 5 per cent., making 15 per cent., for the year 1928.

CROSSLEY BROTHERS.—The net profit for 1928 amounts to £56,813, as compared with £51,882 for 1927. Adding the balance of £96,724 brought forward there is £153,537, out of which a dividend has been paid on the preference shares at the rate of 7 per cent. per annum for the first-half of the year, amounting to £14,119. It is proposed to pay a further dividend for the second half of the year at the rate of 7 per cent. per annum on the preference shares, and to carry forward the balance of £125,300. The annual meeting will be held at Manchester on February 25, at 2.30 p.m.

COURTAULDS, LTD.—The profits for 1928, after charging all taxation, depreciation and expenses, amount to £5,171,996. The directors have decided to carry £1,000,000 to general reserve account, and recommend a final dividend of 10 per cent., tax free, for the year ended December 31 on the ordinary share capital, making 15 per cent., free of income tax, for the twelve months, and to carry forward £1,394,716. The dividend will be payable on March 12. The profits for 1927 amounted to £4,585,921, after charging depreciation, etc., and after carrying £250,000 to special reserve. The final dividend was 3s. 6d. per share, free of tax, together with a capital bonus, and £1,222,719 was carried forward.

BRADFORD DYERS' ASSOCIATION.—For the twelve months ended December 31 last the accounts show that profits, after crediting surplus provisions in respect of excess profits duty and corporation profits tax, and after providing an estimated amount in respect of the employés' bonus register, income-tax and other contingencies, amount to £817,994, to which has to be added £563,022 brought forward, making £1,381,016. From this sum have to be deducted interest on debenture stock, £58,150, depreciation on buildings, plant and machinery, motor vehicles, furniture and fixtures, £208,821, and an amount transferred to investments contingency fund of £85,753, leaving £1,028,292. It is recommended that there should be appropriated £81,389 to reserve for equalisation of dividends, making, it £217,036, £188,886 to the reserve fund, making it £500,000 £10,000 for the benefit of employés, and that a final dividend on the ordinary shares at the rate of 1s. 3d. per share be paid, making 2s. 3d. per share for the year, carrying forward £378,851. The annual meeting will be held on February 28.

China Clay Imports for January

A RETURN showing the quantities and value of China Clay, including China Stone, imported into Great Britain and Northern Ireland as registered in the month of January, 1929 indicates that imports (from France) were valued at £2.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52, Chancery Lane, London, W.C 2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks, and Designs.

Opposition to the registration of the following Trade Marks can be lodged up to March 13, 1929.

NAPHTOKAL.

497,584. Class 1. Chemical substances used in manufactures, photography, or philosophical research and anti-corrosives. I.G. Farbenindustrie Aktiengesellschaft (a joint stock company organised under the laws of Germany), Mainzerlandstrasse 28, Frankfort-on-Main, Germany; manufacturers. November 29, 1928. (To be Associated. Sect. 24.)

DIGINUTIN.

498,073. Class 3. Chemical substances prepared for use in medicine and pharmacy. The Wellcome Foundation, Ltd., 67, Holborn Viaduct, London, E.C.1; manufacturing chemists. December 13, 1928. (To be Associated. Sect. 24.)

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

ARSENITE OF SODA.—Tenders are invited for the supply of the following cattle dipping material to the Swaziland Government during the year April 1, 1929, to March 31, 1930:—Approximately 40 tons (80,000 lb.) of arsenite of soda containing 80 per cent. arsenious oxide, and suitable for cattle dipping purposes; or a quantity, equivalent to 40 tons of arsenite of soda, of any other cattle dipping material. Sealed tenders, superscribed "Tender for Cattle Dipping Material," must be addressed to Mr. W. A. Elder, Principal Veterinary Officer, Mbabane, Swaziland, and must be in his hands by 12 noon on Wednesday, March 20. (Reference B.5112).

WOOD AND COAL TAR, ETC.—The Egyptian Ports and Lighthouses Administration is calling for tenders to be presented in Alexandria by March 18 for the supply of paints, varnishes, soap, pitch, wood and coal tar, etc. during the year 1929–1930. (Reference Nol BX. 5120.)

CHEMICAL PRODUCTS, ETC.—An old-established firm of wholesale and retail dealers in chemical products, etc., of Barcelona, desire to represent, on a commission basis, British manufacturers of or dealers in the following:—Arsenic, sodium bichromate, potassium bichromate, sodium cyanide, potassium cyanide, oxalic acid, formic acid, ammonium carbonate and such industrial chemical products as are not manufactured in Spain; "Colas Mordientes" varnish gums, gum tragacanth, Kordofah and Talha gums; Colonial products from British India and British Possessions. (Reference No. 124.)

COAL TAR AND COAL TAR PRODUCTS.—An important company in San Francisco is anxious to get into touch with United Kingdom suppliers of coal tar and coal tar products. (Reference No. B.X. 5099.)

John Benn Hostel Ballot Result

THE results and a full list of prize winners in the Boys' Ballot, organised by the East End Hostels Association, in aid of the John Benn Hostel for Boys at Stepney, were published in *The Daily Telegraph* on Wednesday. Competitors were asked to place a dozen favourite sports and pastimes in the most popular order, and the winner of the first prize, Mrs. F. Bromfield, Huntley, N.B., who receives a saloon car, succeeded in accurately placing all the twelve sports in the order which the voting declared to be most popular. The following was the result of the voting—Association Football, Motoring, Tennis, Dancing, Cricket, Golf, Rugby Football, Cycling, Billiards, Bowls, Boxing and Hockey.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

HEWITT AND SON, 238, Blackfriars Road, S.E., wholesale chemists. (C.C., 23/2/29.) £54 11s. December 17, and £66 12s. 8d. January 17.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case, the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

LILY HILL DYEING CO., LTD.—(M., 23/2/29.) Registered January 14, series of £6,000 debentures, present issue £2,000; general charge. *£2,000. July 5, 1928.

URMSTON, LTD., Leigh (Lancs), mineral water manufacturers. (M., 23/2/29.) Registered February 5, 2nd charge, to Bank, charged on 76 and 78, King Street, Leigh, etc. *Nil. December 28 1927.

WARDLE (JOSHUA), LTD., London, E.C., textile dyers.—(M., 23/2/29.) Registered February 6, £2,000 (not ex.) charge, to Bank; charged on Leekbrook Dyeworks, near Leek.

Satisfaction

LEVER BROTHERS, LTD., Port Sunlight, soap manufacturers. (M.S., 23/2/29.) Satisfaction registered February 9, £108,315, part of amount registered April 13, 1931.

London Gazette, &c.

Companies Winding Up Voluntarily

LANCASHIRE ULTRAMARINE CO., LTD. (C.W.U.V., 23/2/29.) By Special Resolutions January 24, confirmed February 11. N. Harrison, County Square, Ulverston, appointed as liquidator.

NATIONAL DRY CLEANERS, LTD. (C.W.U.V., 23/2/29.) By reason of its liabilities January 28. S. Hollens, Lyn Dene, 89, Colliers Water Lane, Thornton Heath, Surrey, and A. Stanton, 42, Dunmore Road, Wimbledon, S.W., appointed as joint liquidators.

PASTEX DYES, LTD. (C.W.U.V., 23/2/29.) By Special Resolution, January 25, confirmed February 13. M. C. Spencer, F.C.A., Price, Waterhouse and Co., 3, Fredericks Place, Old Jewry, E.C., appointed as liquidator. All creditors have been, or will be, paid in full, the business having been sold to a new company.

New Companies Registered

ARRAN BARYTES CO., LTD., 79, West Nile Street, Glasgow, C.1. Registered as a "private" company on February 15, in Edinburgh. Nominal capital, £50,000 in 35,000 "A" and 15,000 "B" shares of £1 each. To adopt an agreement with R. Robertson (sole surviving partner of Martin Barrowman and Co., mineowners and manufacturers, and the Arran Barytes Co.), to carry on as a going concern and develop the business referred to. Directors: G. A. Dougall, J. A. Gordon, G. E. Thomson and R. Robertson.

CAVENDISH TRADING COMPANY (CHEMICALS), LTD., 16, South Castle Street, Liverpool. Private company. Registered February 18. Nominal capital, £1,000 in 800 ordinary and 200 employees' shares of £1 each. To adopt an agreement between A. W. Foster and J. E. D. Kenrick, and to carry on the business of chemists, druggists, drysalters, oil and colour men, etc. Directors: A. W. Foster, Edith F. Newsham.

REGENT CHEMICALS, LTD., Groathill Road, off Craigleith Road, Edinburgh. Registered in Edinburgh on February 13. Nominal capital, £4,000 in £1 shares. To acquire the business of the Regent Chemical Co., now carried on by J. Sharp at Craigleith Chemical Works, Edinburgh. Directors: J. Sharp, D. A. Finlayson.

Trade in Lyes in Spain

A RECENT Royal Order (No. 1,698), which comes into operation on April 1 next, prescribes regulations regarding the manufature, circulation and sale of lyes for industrial and domestic use in Spain. Industrial lyes are defined as aqueous solutions of alkaline hydrates or carbonates, and those for domestic use as solutions in water of hydrates or carbonates of soda or potash and of hypochlorite. Industrial lyes may be circulated and sold in the strengths adequate for the purposes for which they are destined and must be provided with a label inscribed "lejia industrial" and specifying the strength either in caustic alkali or in degrees Baumé. Lyes for domestic use must be described as such, and the label must clearly indicate the active chlorine content per litre on leaving the factory. Solid products and so-called solid lyes which are sold for the preparation of lyes in the home must specify on the label the grammes of active chlorine which will be produced on dissolving the product in a specified quantity of water. The text of the Order (in Spanish) may be seen by persons interested on application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1.

Dyes and Dermatitis: Unsuccessful Action

JUDGMENT was given for the defendants in an action at Bristol Assizes brought by Mrs. Colley, wife of Mr. Alfred Colley, described as a chemist, against a firm of furriers for damages for alleged breach of warranty. The plaintiff's case was that the fur trimmings of a coat purchased at a sale in November, 1926, were dyed with metaphenylenediamine, and that this dye was responsible for setting up dermatitis. Among the witnesses, Mr. F. O'Brien, analytical chemist, and Dr. Oliver Davis, lecturer in chemistry and toxicology, Bristol University, testified to finding traces of the dye. For the defendants it was stated emphatically that the fur was in its natural state, and had had no dye applied to it, and in support Mr. C. E. Sage, analyst, London, and Mr. H. F. Bark, public analyst, Bath, stated that they failed to find any trace of the dye. The jury found for the defendants, for whom judgment was entered with costs.

Drying Town Gas with Glycerine

AT the Colwyn Bay gasworks a plant (the first of its kind) for drying the gas by treatment with glycerine has been in successful operation for some months. The glycerine, after absorbing water, is subsequently regenerated, removing the latter by distillation. The plant was erected to the design of Kirkham, Hulett and Chandler, being completed by an automatic evaporator of George Scott and Son's design. The total cost of operating the process is given as 13s. 3d. per million cubic feet of gas per 24 hours; in other words, the cost of drying 1,000 cubic feet of gas is 0·15d. The plant has a capacity of 2,000,000 cubic feet per day. Tests of the plant indicate that the saturation of the gas at the outlet of the dryer is 40·5 degrees humidity, the dewpoint being reduced from 62·5° to 37° F.

Expansion of Ontario Nickel-copper Refinery

AN official announcement by the general manager of the International Nickel Co. states that extensions are to be made to the nickel refinery at Port Colborne, Ontario, at an approximate cost of $1,500,000. The proposed additions will comprise three more electrolytic units, which with the four already installed will bring the total to seven. This refinery was one of the works visited by the British chemical engineers on their visit to Canada this year.